

FIG. 1

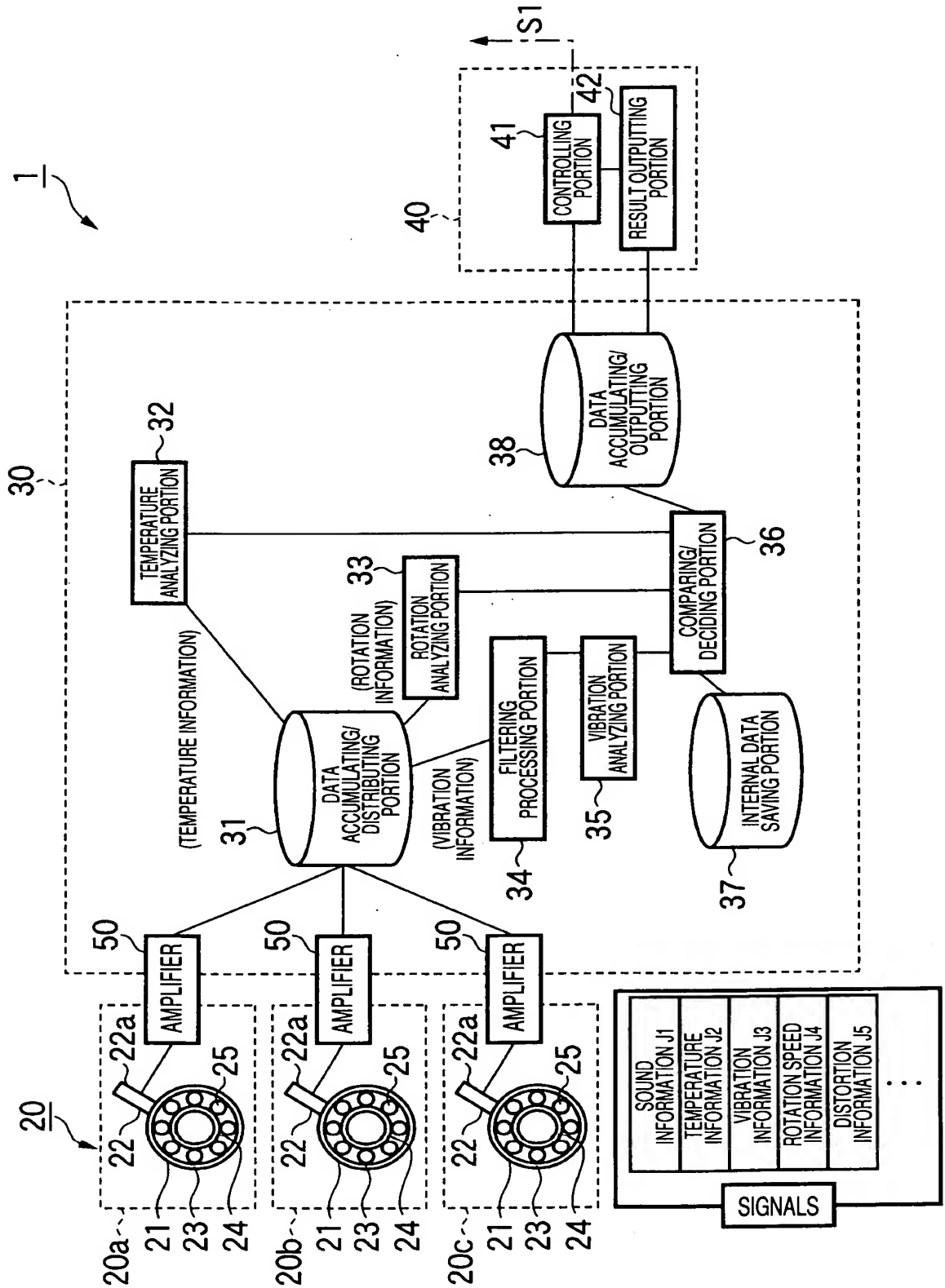


FIG. 2(a)

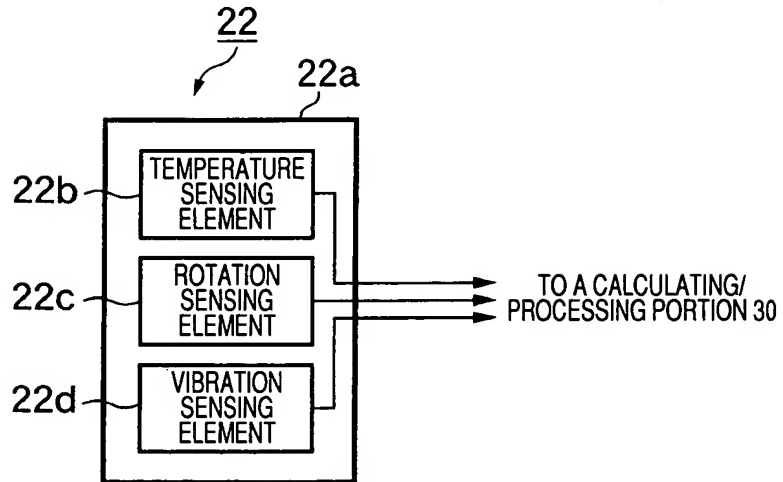


FIG. 2(b)

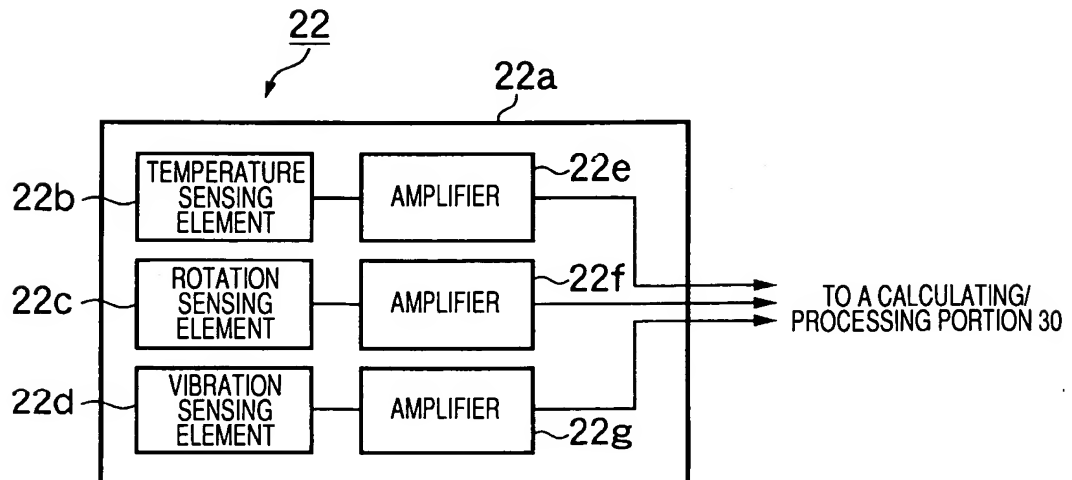


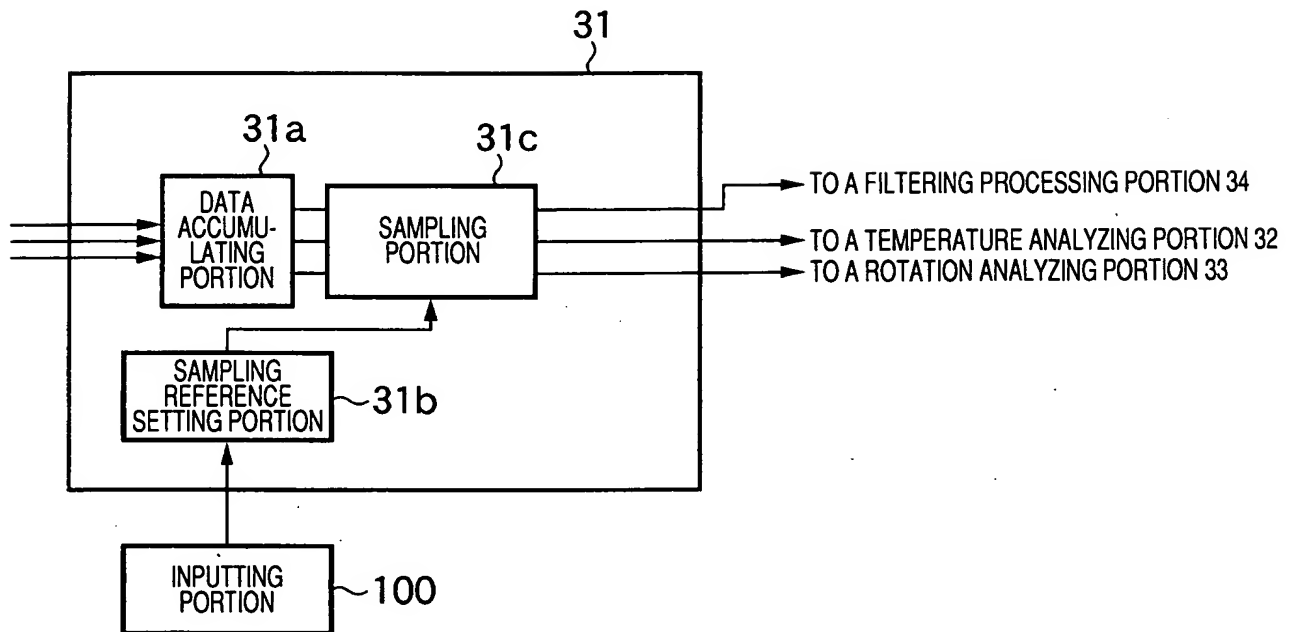
FIG. 3

FIG. 4

FLAW OF A ROLLING BEARING	FREQUENCY AFTER AN ENVELOPING PROCESS
INNER RING (Si)	$z f_i = \frac{f_r}{2} \left(1 + \frac{D_a}{d_m} \cos \alpha \right) Z \quad [\text{Hz}]$
OUTER RING (So)	$z f_c = \frac{f_r}{2} \left(1 - \frac{D_a}{d_m} \cos \alpha \right) Z \quad [\text{Hz}]$
ROLLING ELEMENT (Sb)	$2 f_b = f_r \left(1 - \frac{D_a^2}{d_m^2} \cos^2 \alpha \right) \quad [\text{Hz}]$
RETAINER (Sc)	$f_c = \frac{f_r}{2} \left(1 - \frac{D_a}{d_m} \cos \alpha \right) \quad [\text{Hz}]$

f_r : INNER RING ROTATION SPEED [Hz]

f_c : RETAINER ROTATION SPEED [Hz]

f_b : ROLLING ELEMENT ROTATION SPEED [Hz]

d_m : PITCH CIRCLE DIAMETER [mm]

Z : NUMBER OF ROLLING ELEMENTS

f_i : $f_r - f_c$

D_a : ROLLING ELEMENT DIAMETER [mm]

α : CONTACT ANGLE [DEGREE]

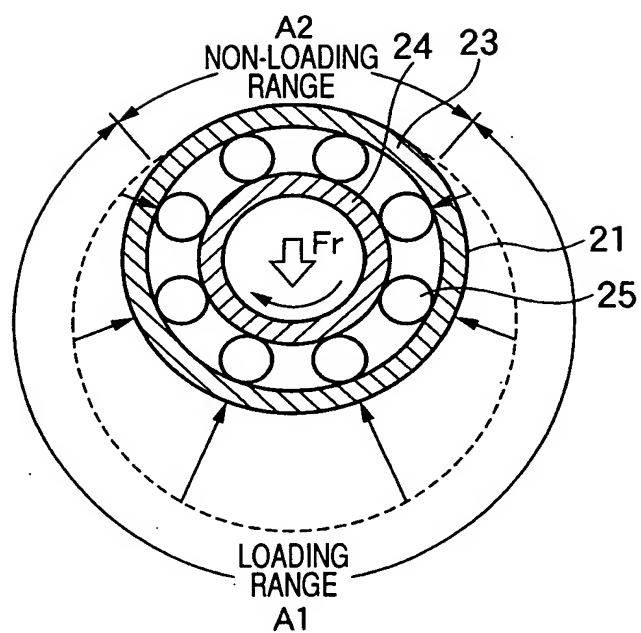
FIG. 5

FIG. 6

TIME-VARIANT WAVEFORM

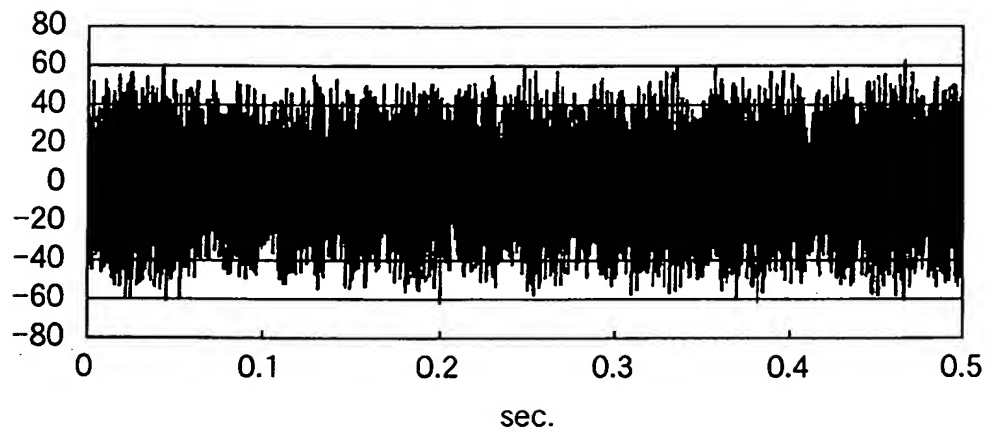


FIG. 7

FFT SPECTRUM

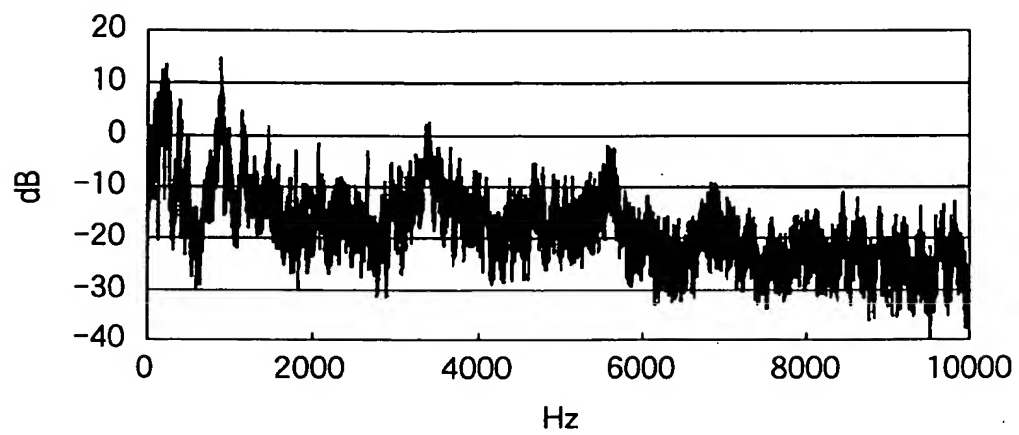


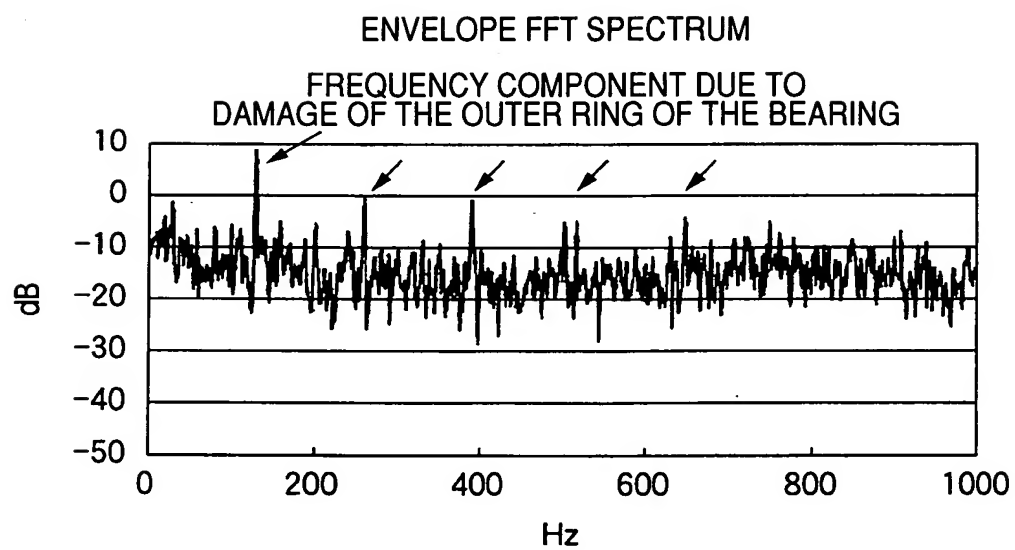
FIG. 8

FIG. 9

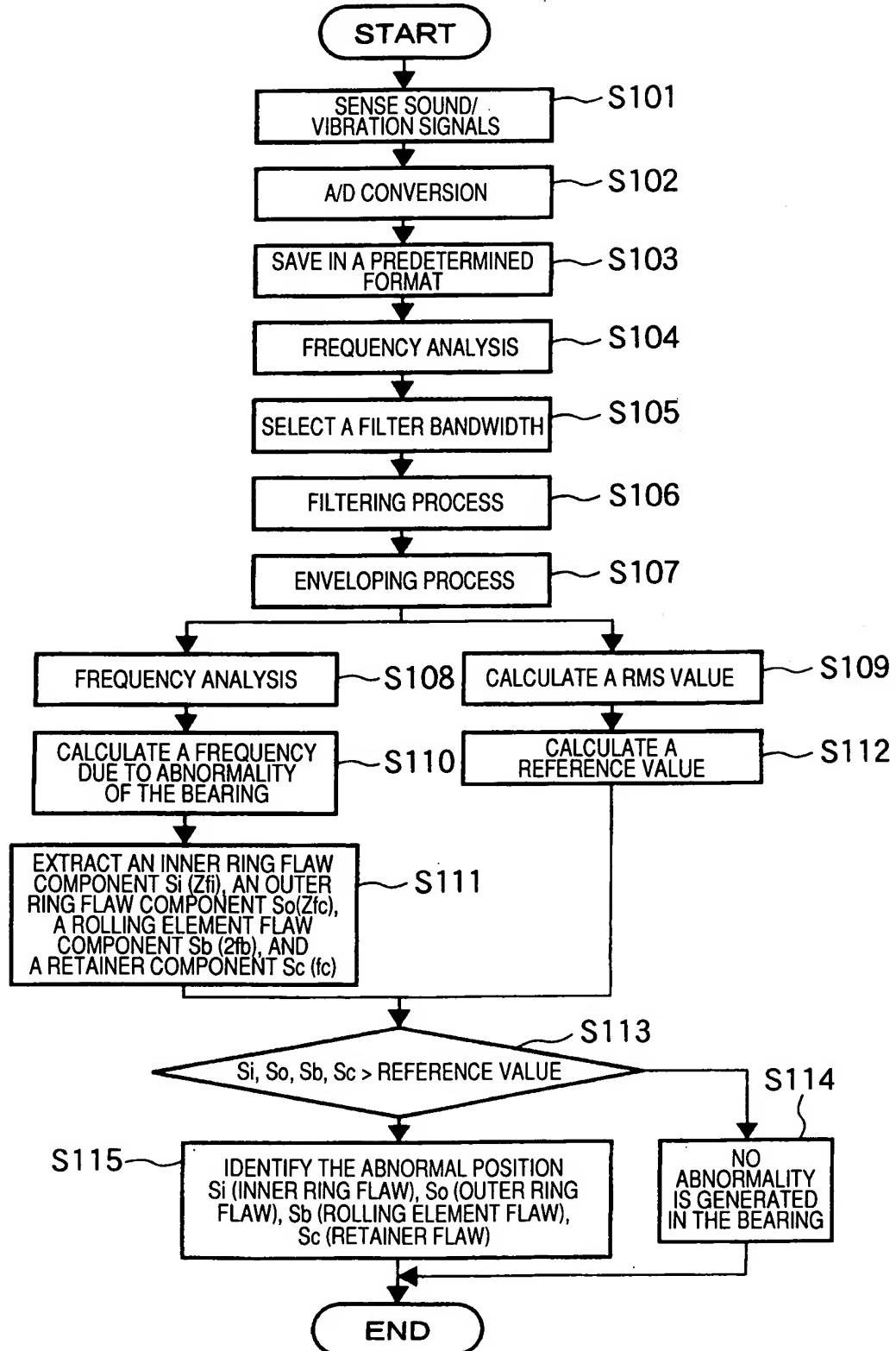


FIG. 10

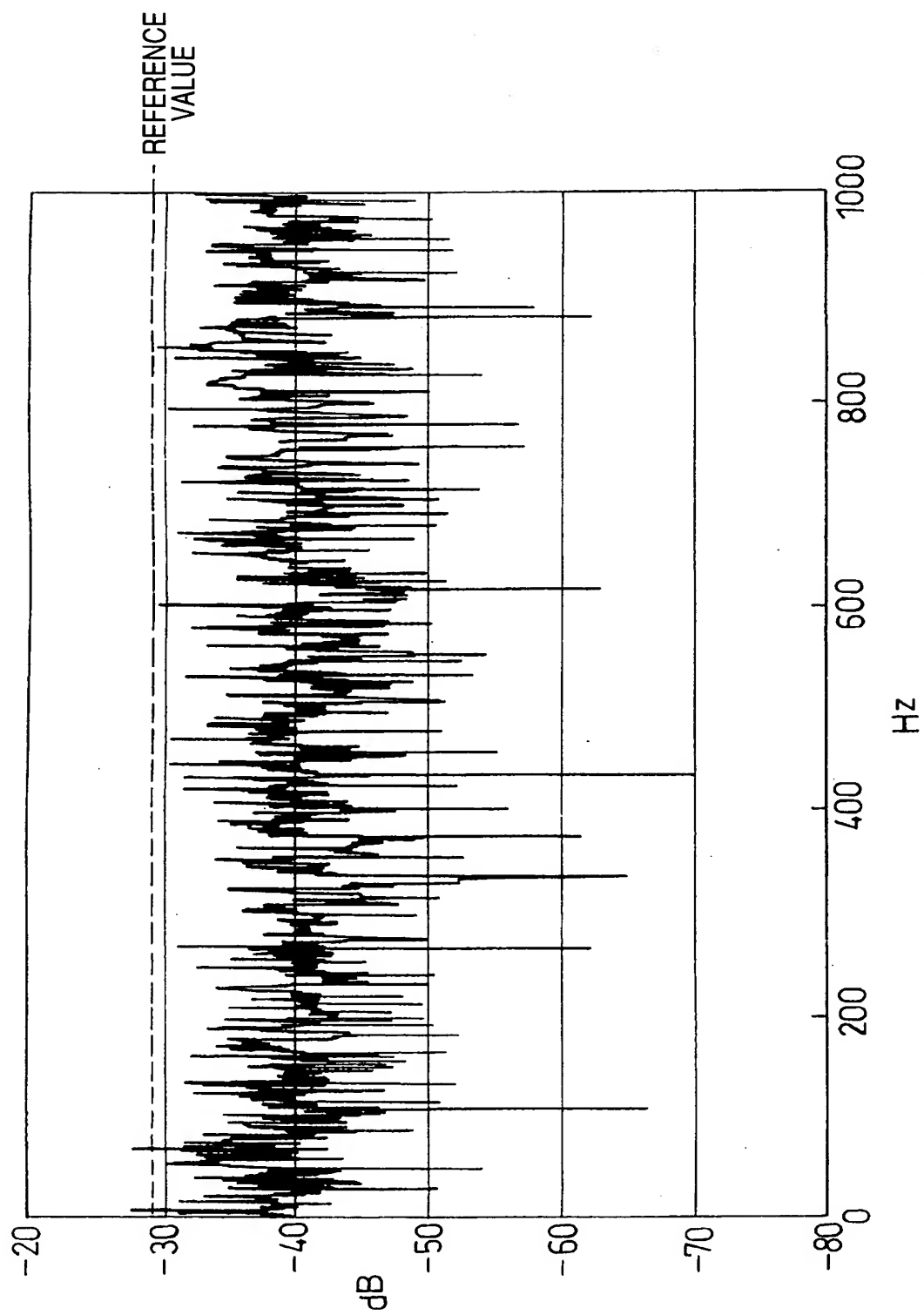


FIG. 11

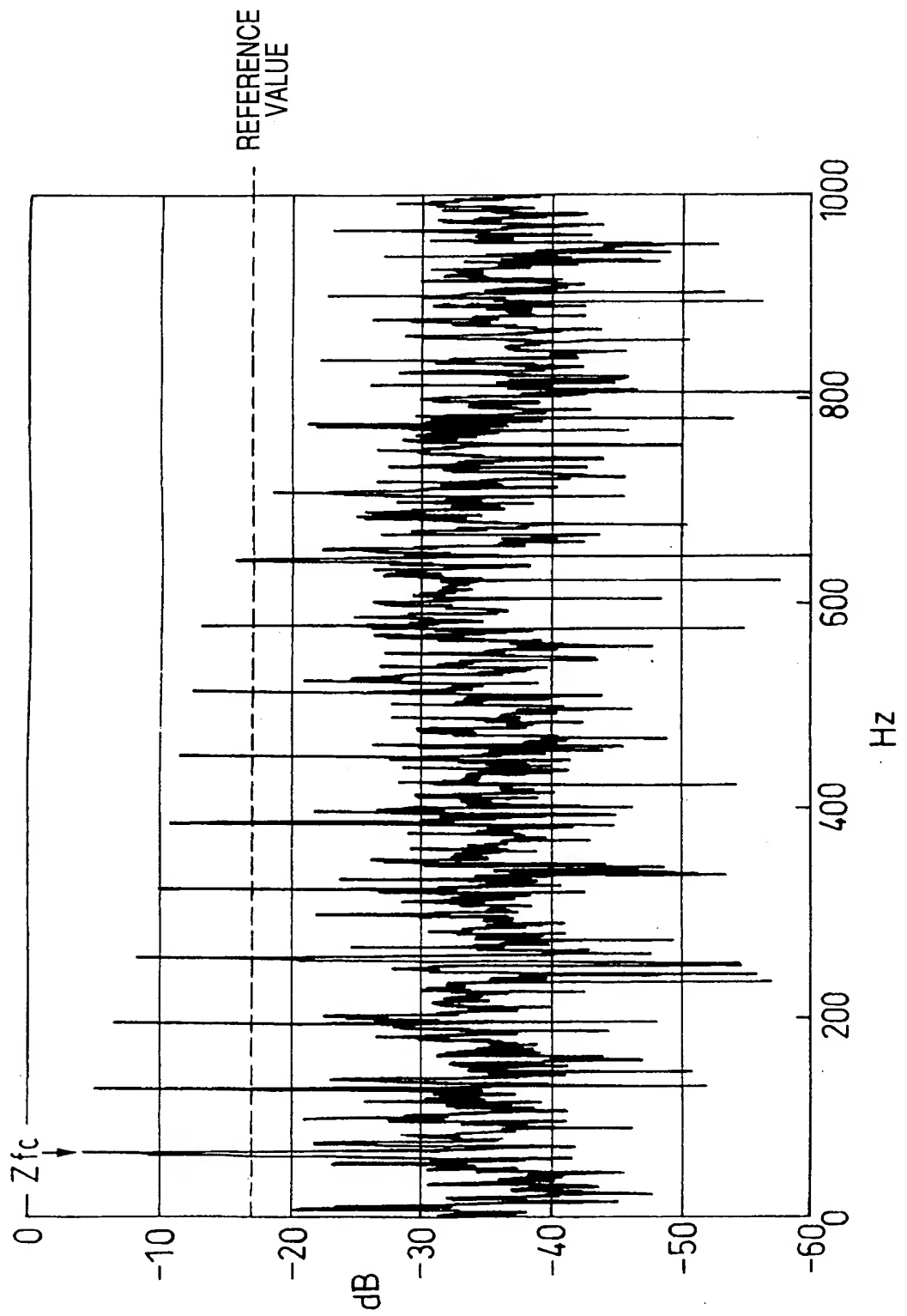


FIG. 12

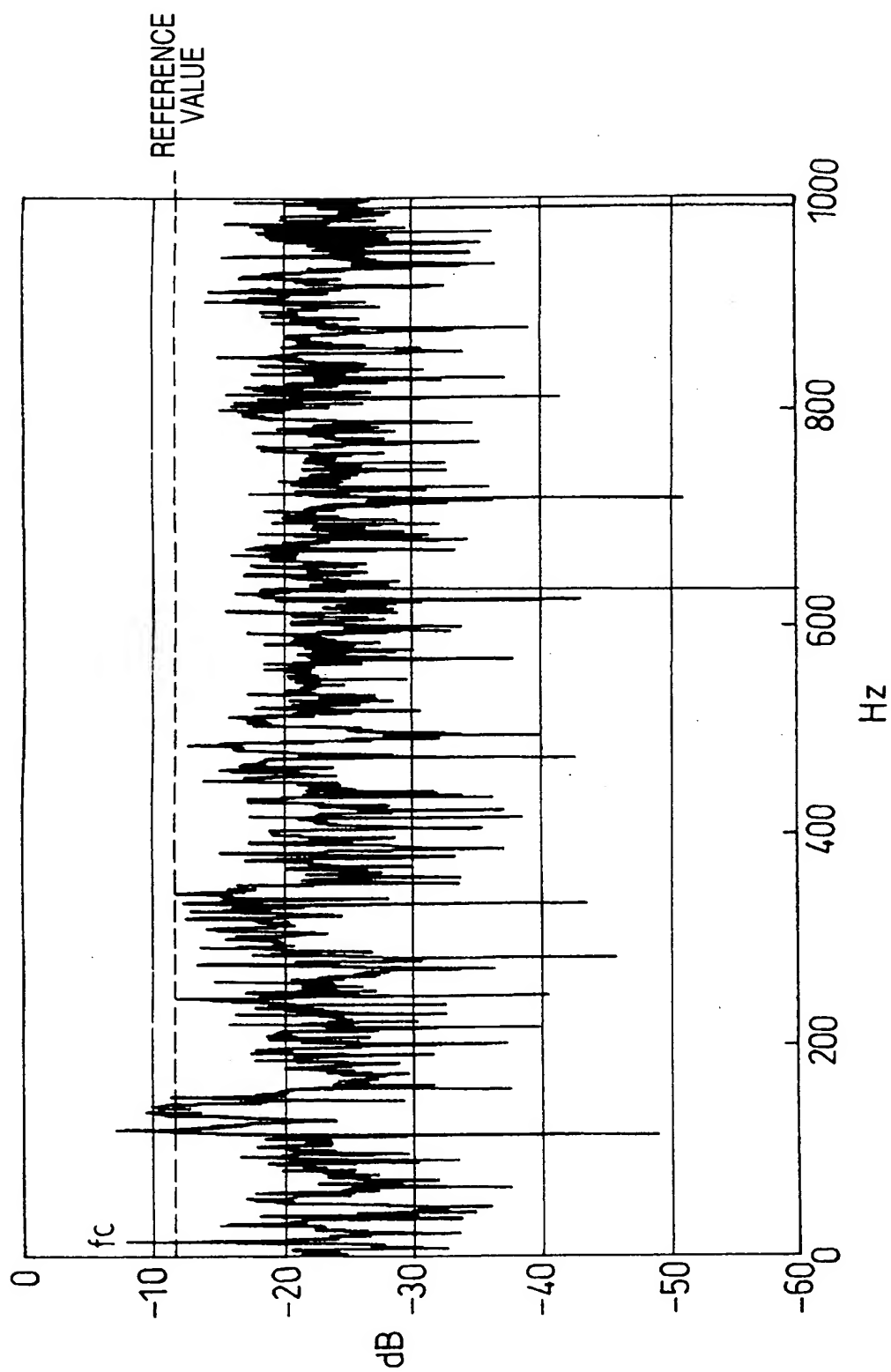


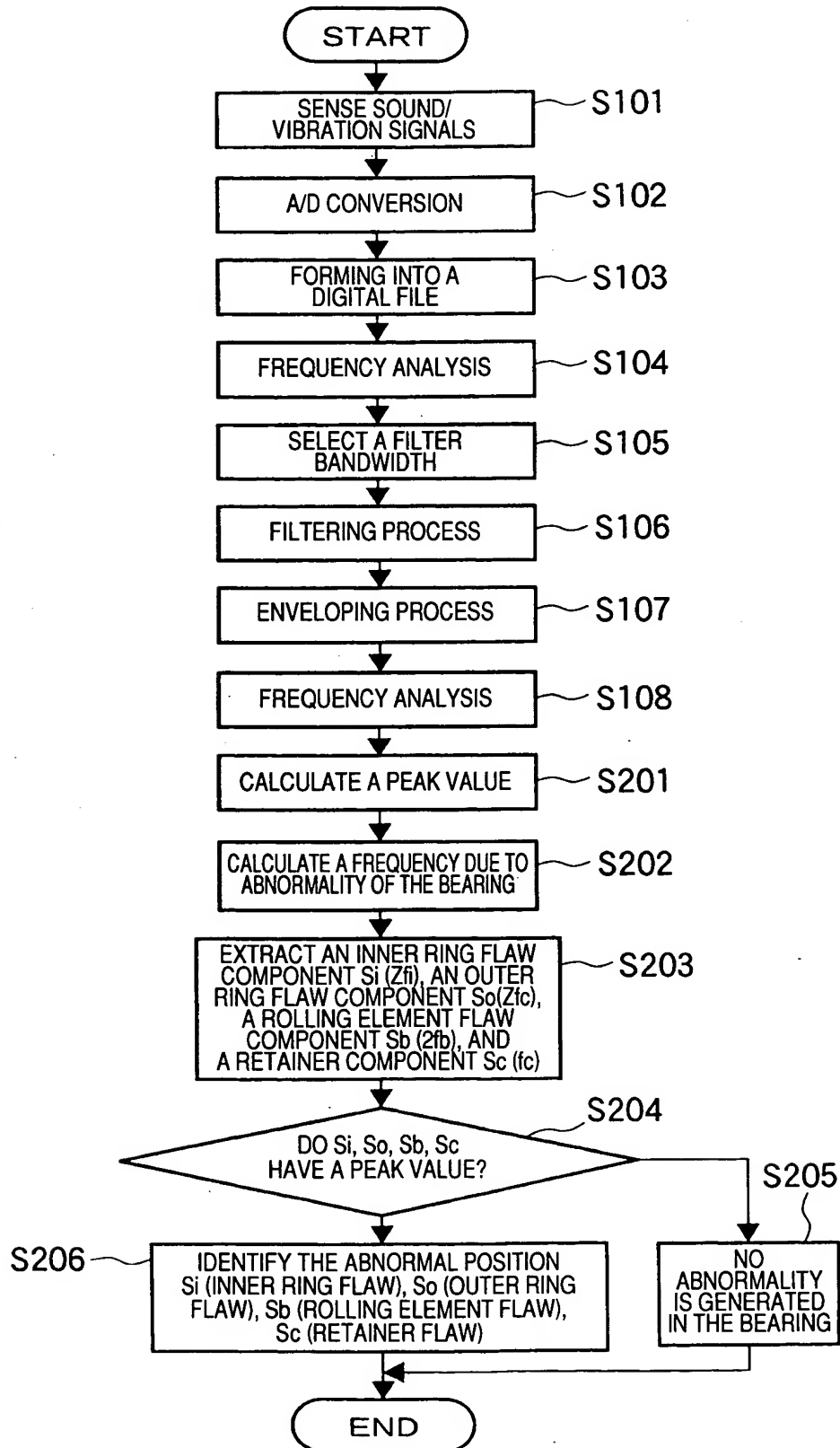
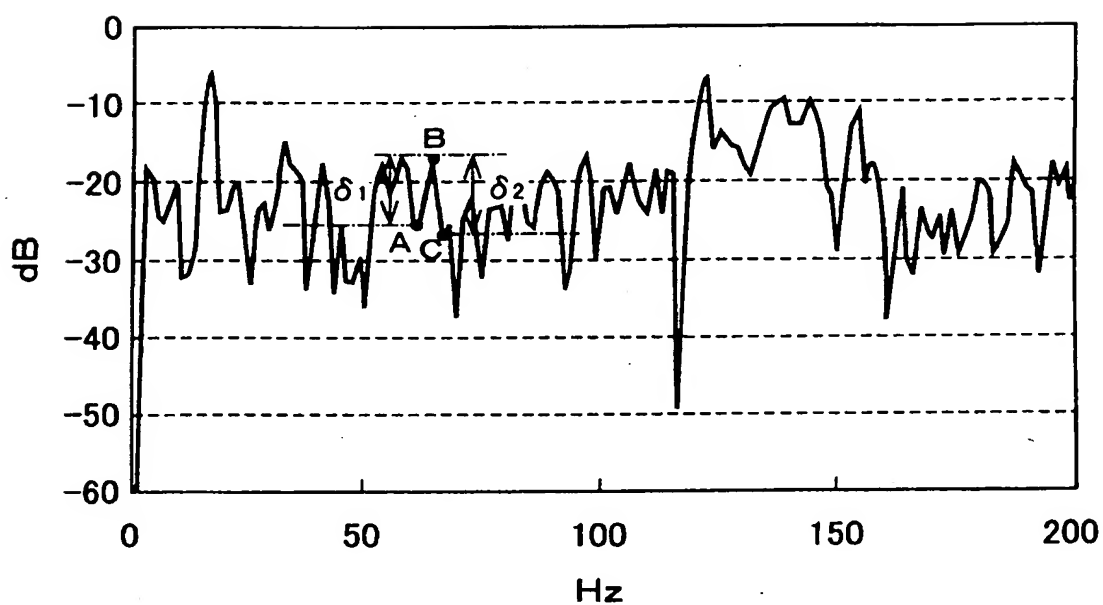
FIG. 13

FIG. 14

$$\delta_1(=Y_1-Y_0)>0 - (1)$$

$$\delta_2(=Y_2-Y_1)<0 - (2)$$

WHERE A (X_0, Y_0), B (X_1, Y_1), C (X_2, Y_2).

WHEN (1), (2) ARE SATISFIED AND

$$dy/dx=(Y_1-Y_0)/(X_1-X_0)>1$$

OR

$$dy/dx=(Y_2-Y_1)/(X_2-X_1)<-1$$

IS SATISFIED, Y_1 IS DECIDED AS A PEAK.

FIG. 15

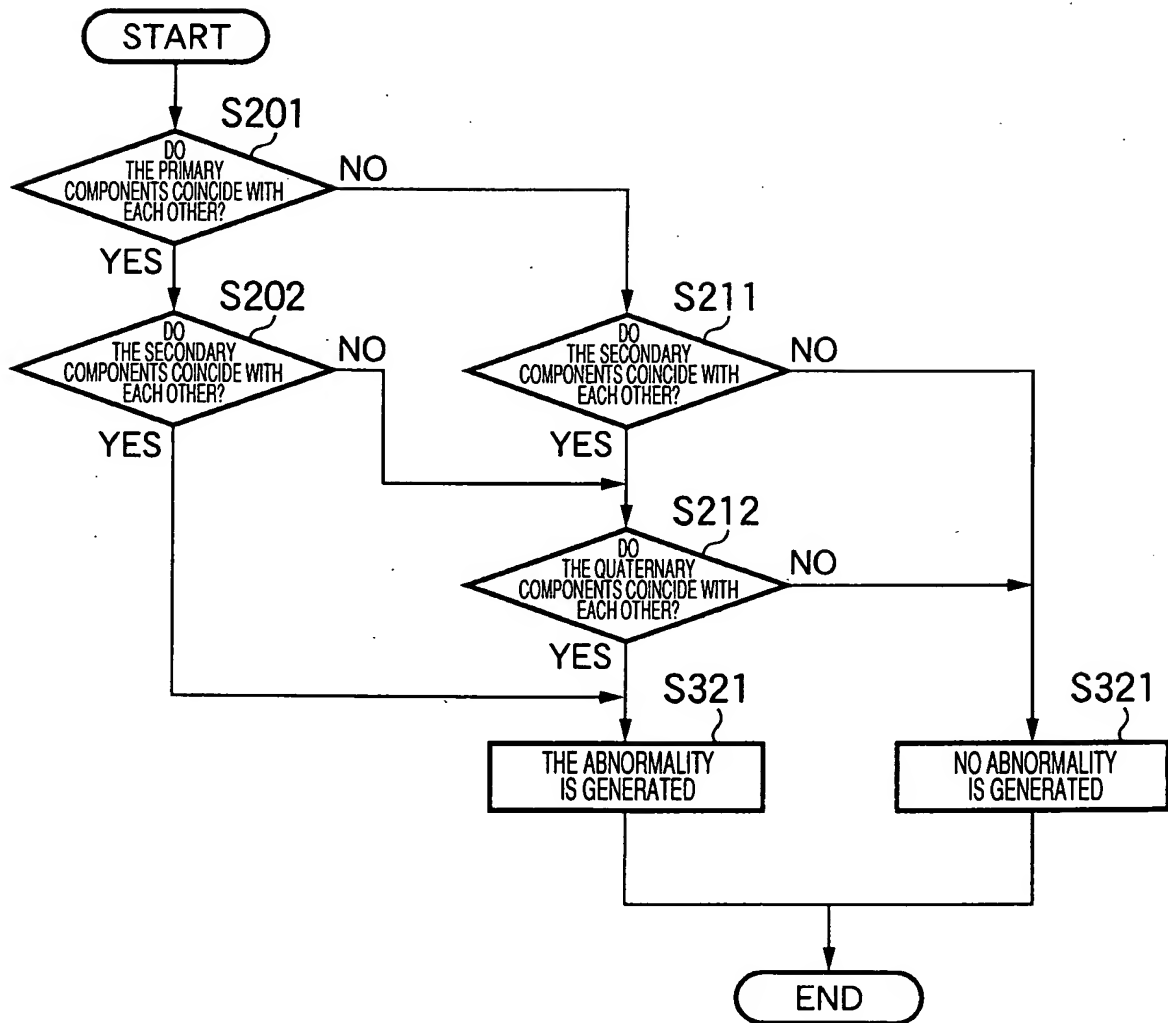
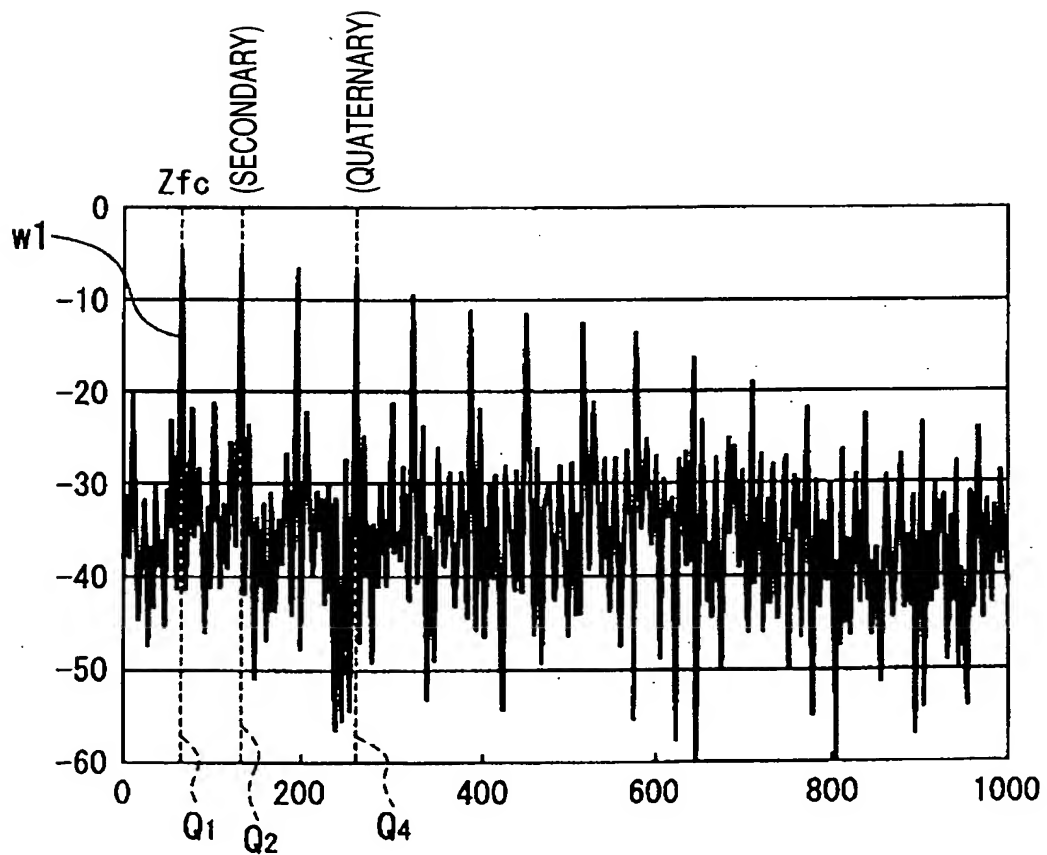


FIG. 16

COLLATE ONLY THE PRIMARY, SECONDARY, QUATERNARY
COMPONENTS (FLAW OF THE OUTER RING)

FIG. 17

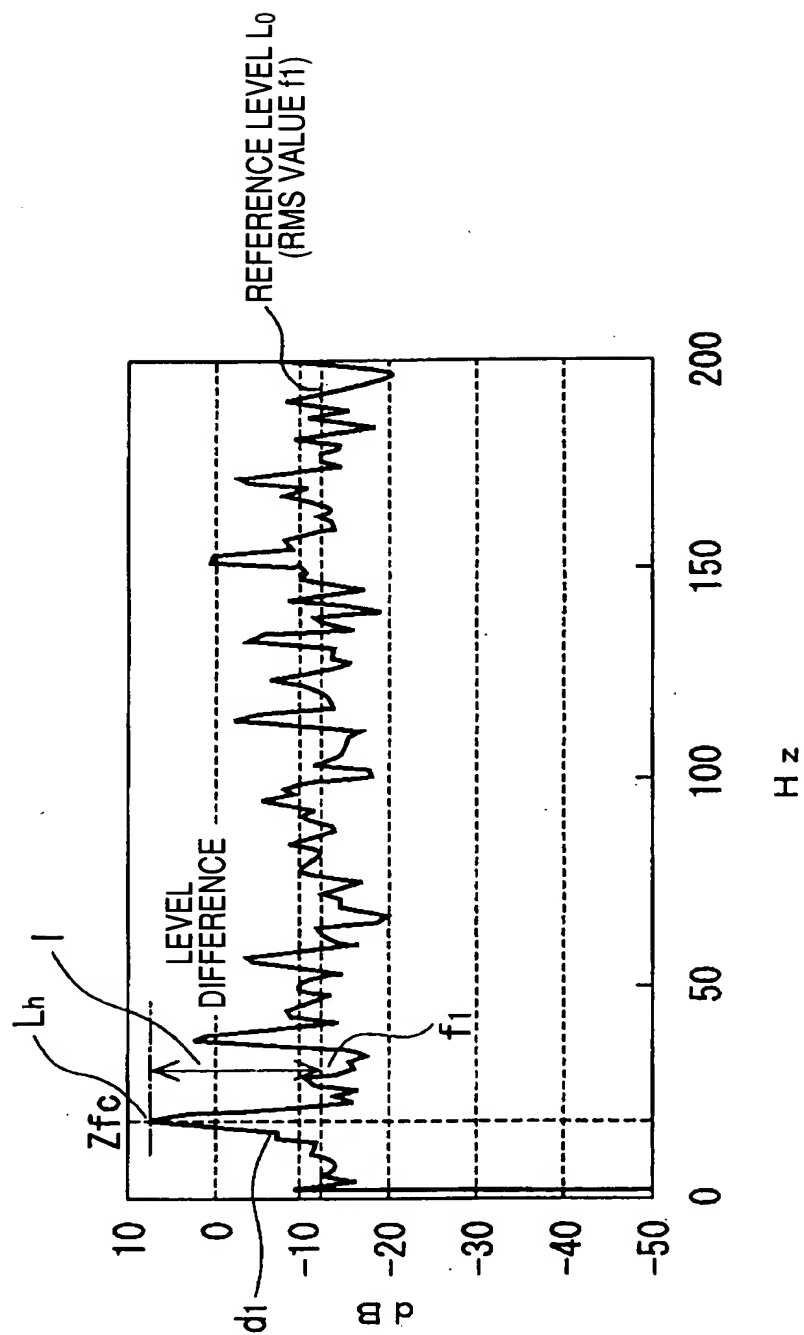
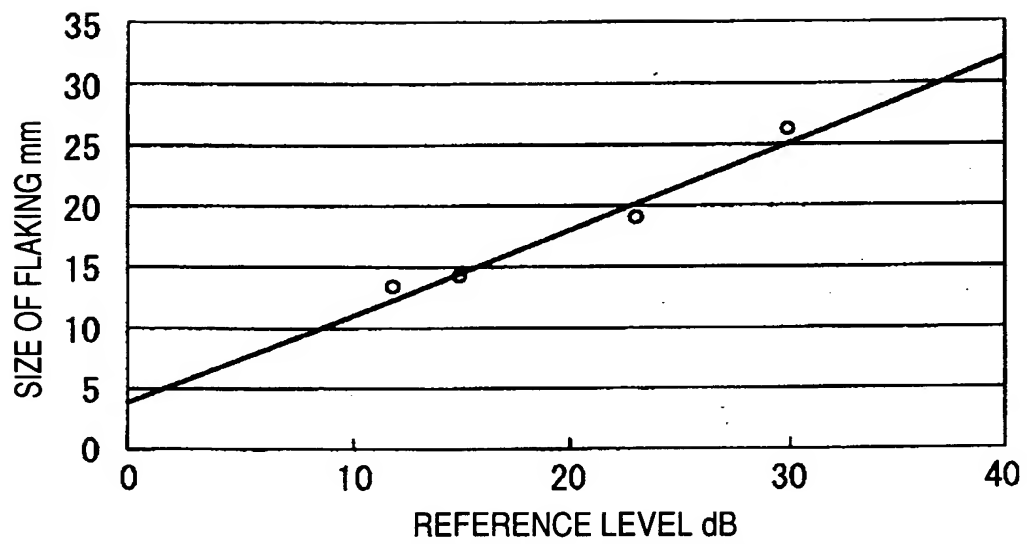


FIG. 18

A RELATIONSHIP BETWEEN A SIZE OF
FLAKING AND A LEVEL DIFFERENCE

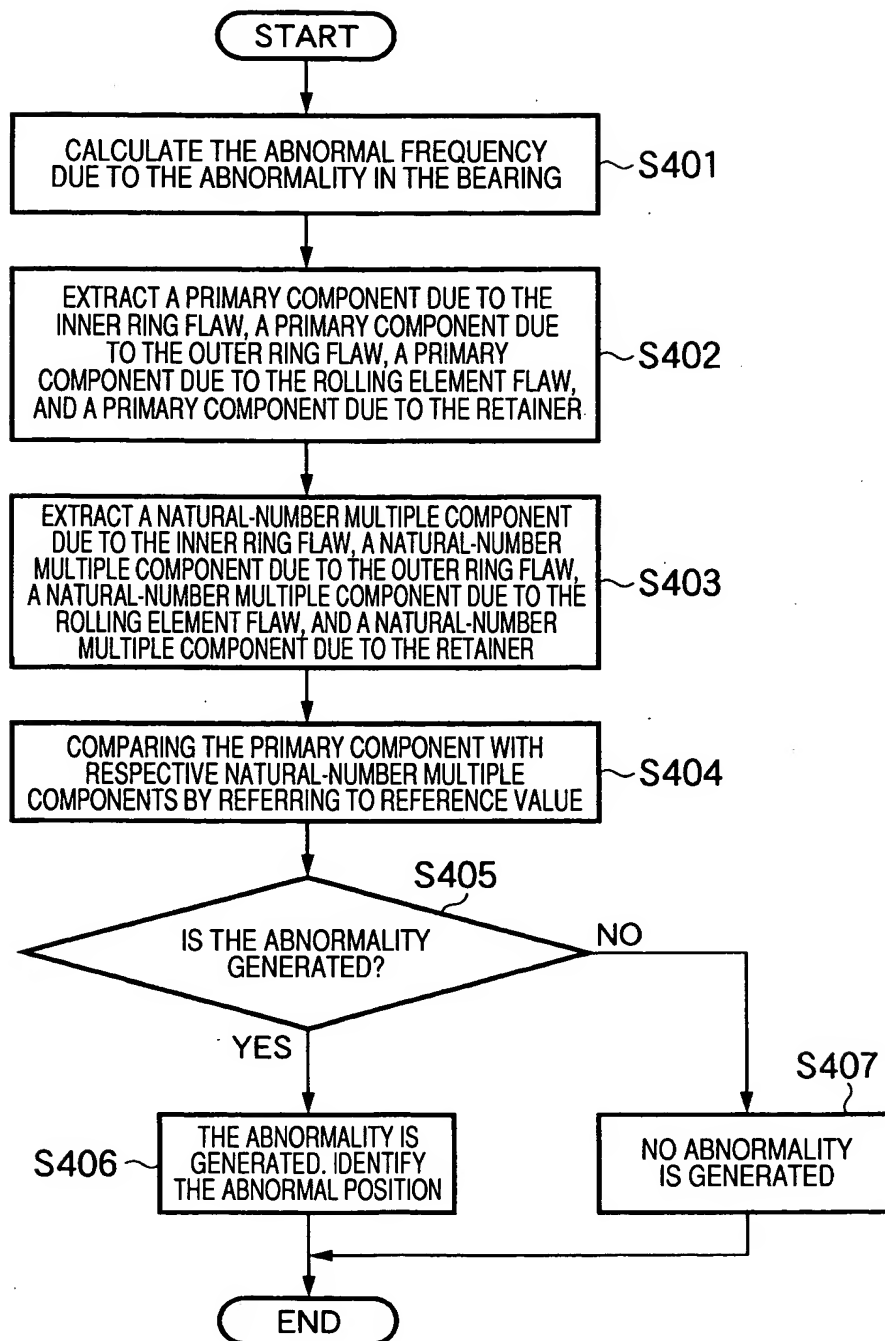
FIG. 19

FIG. 20

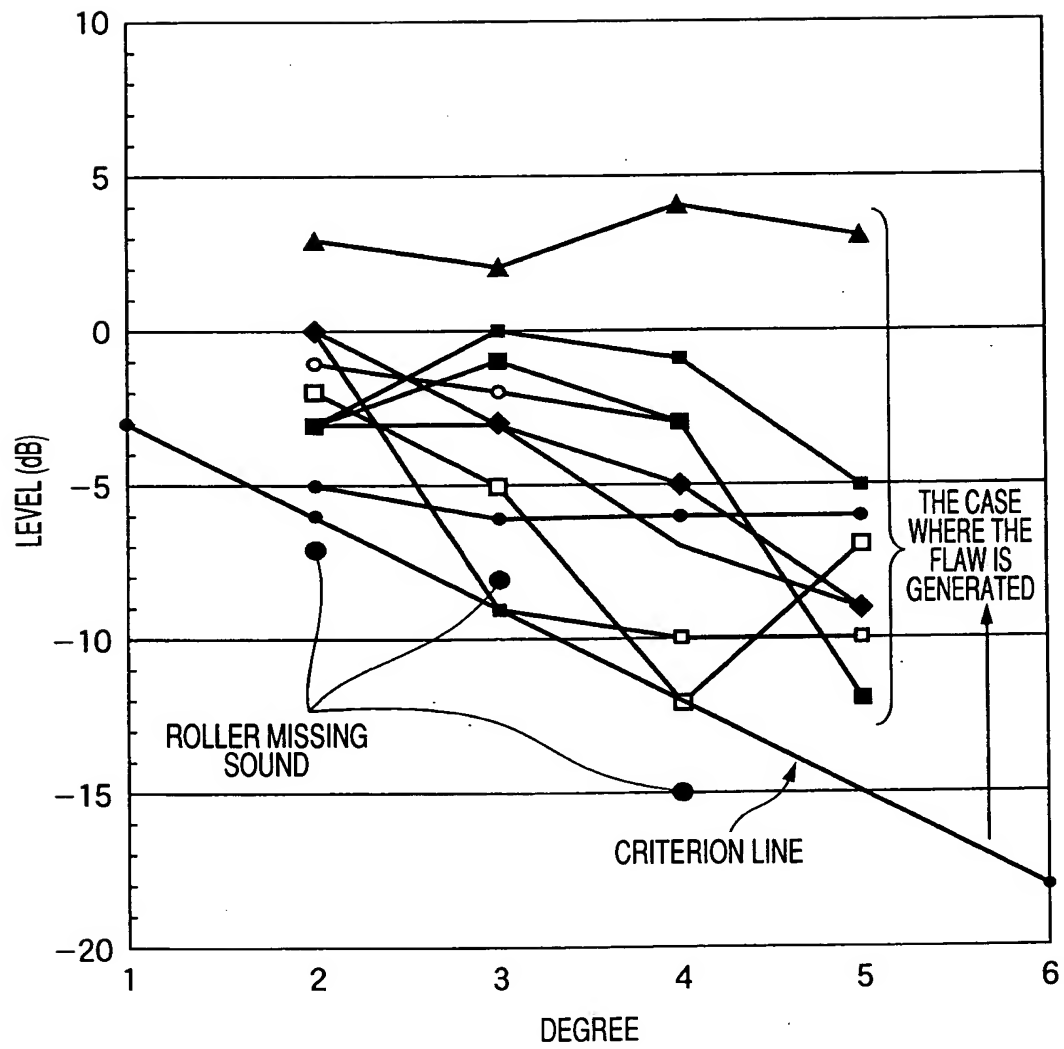


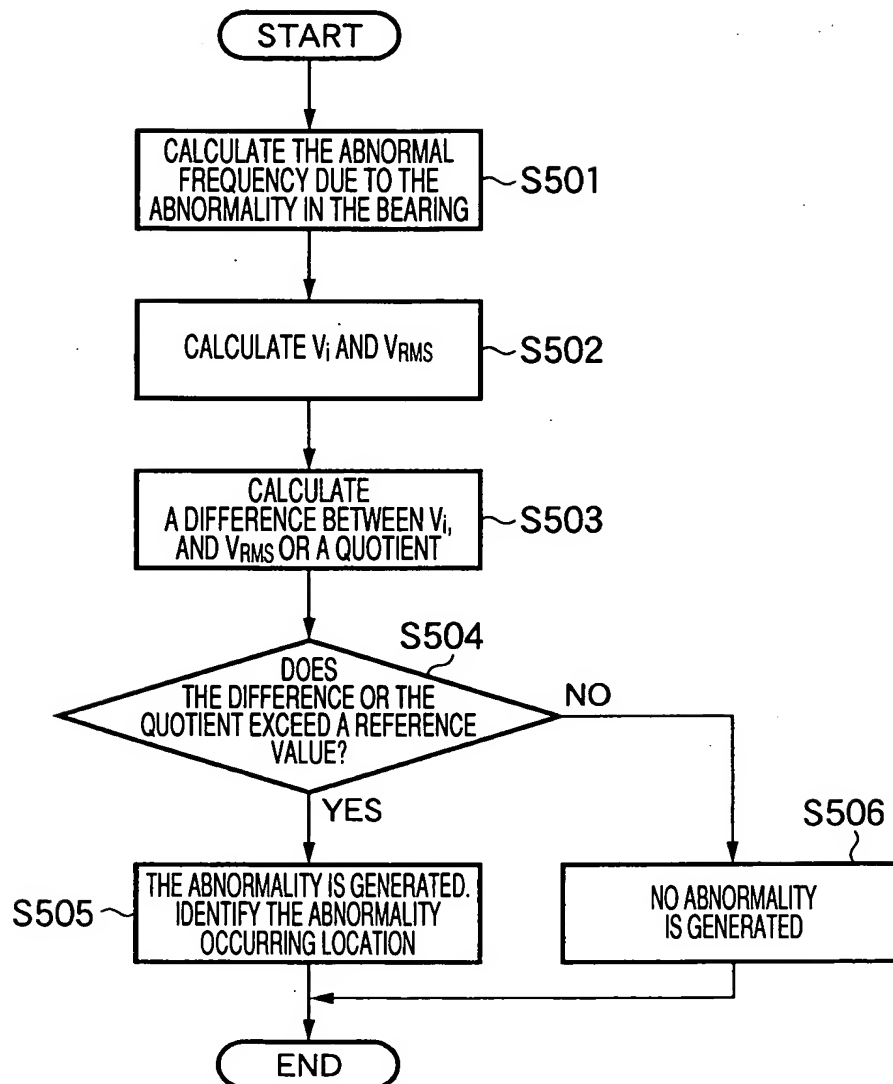
FIG. 21

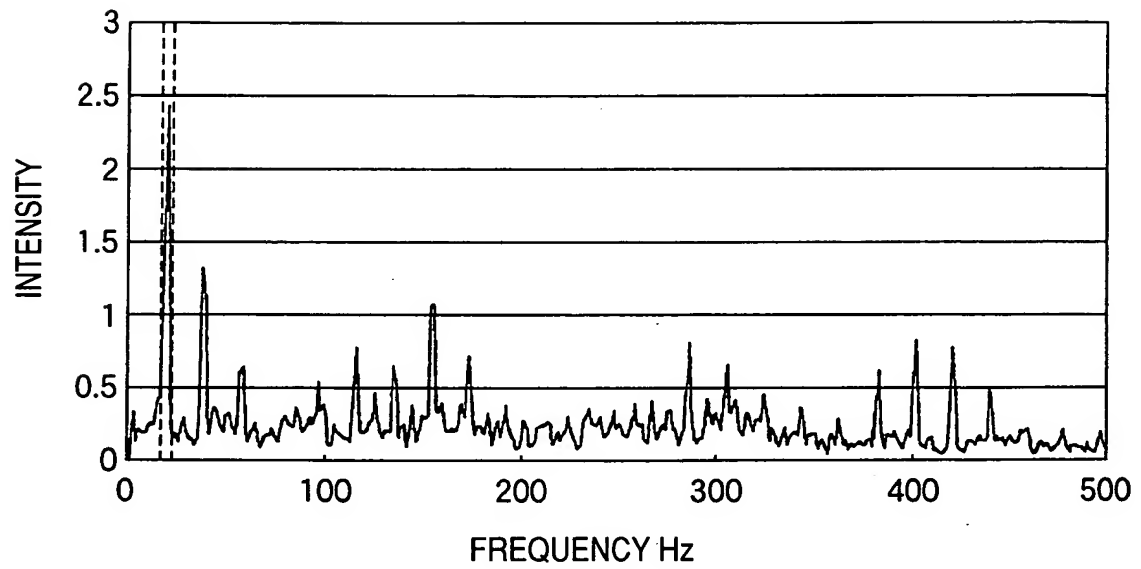
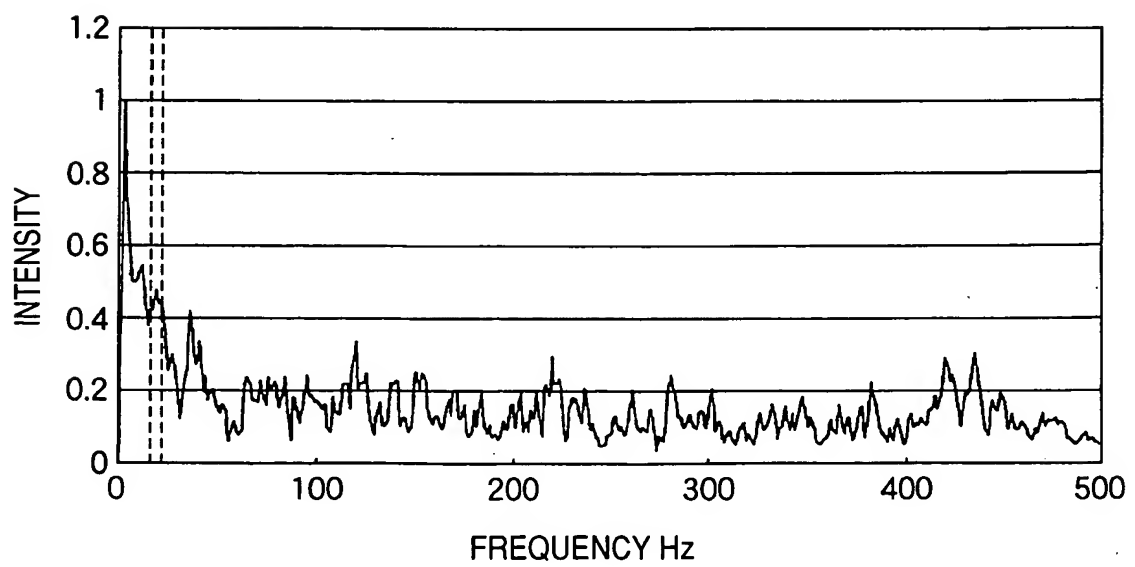
FIG. 22*FIG. 23*

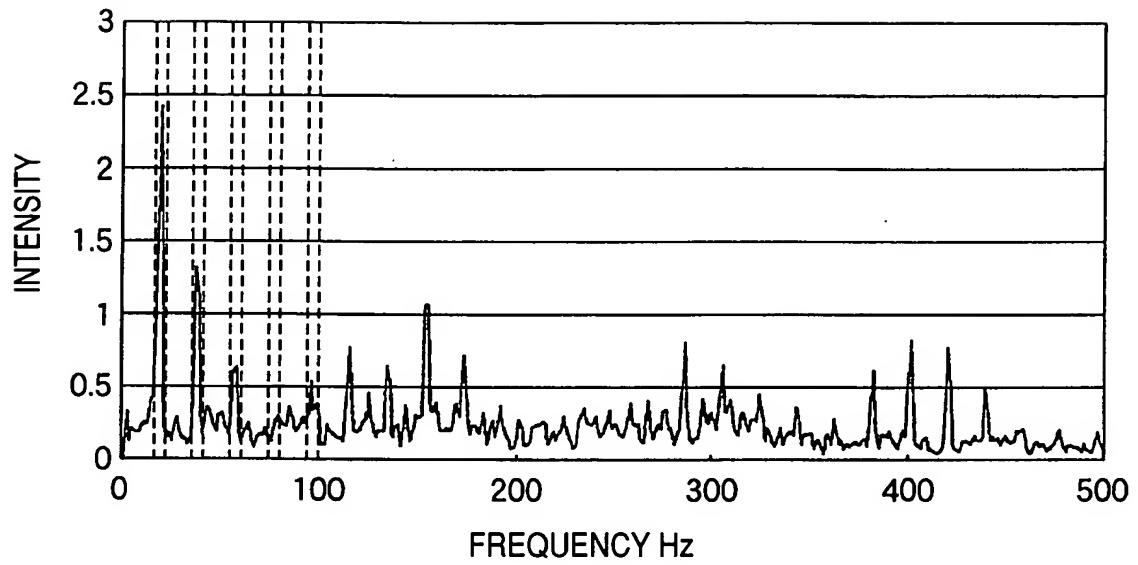
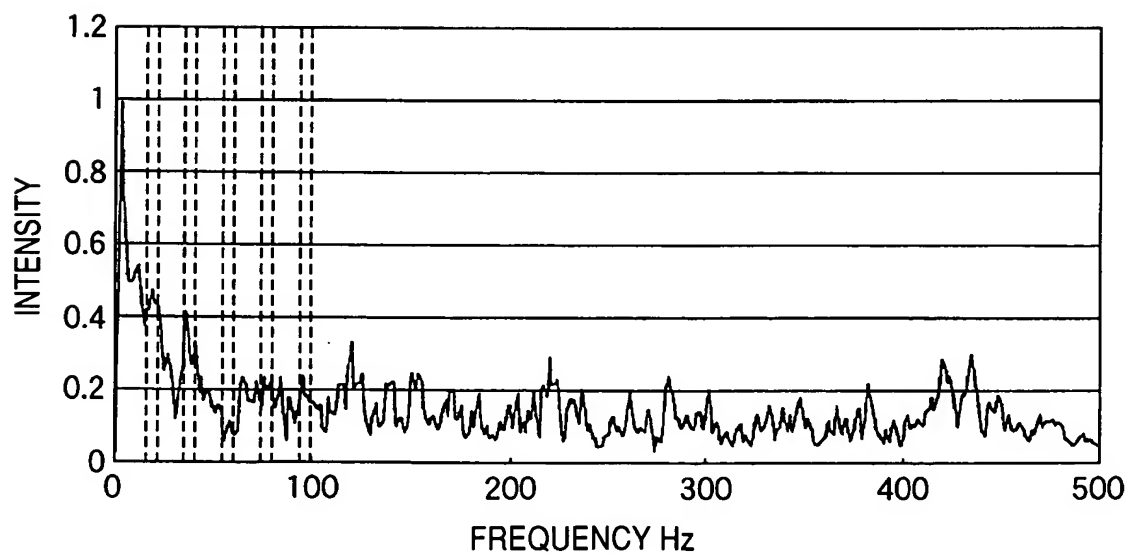
FIG. 24*FIG. 25*

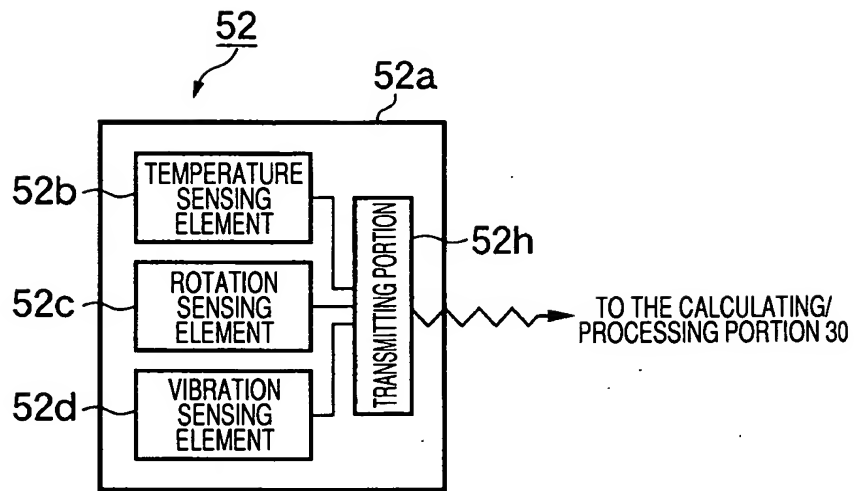
FIG. 26

FIG. 27

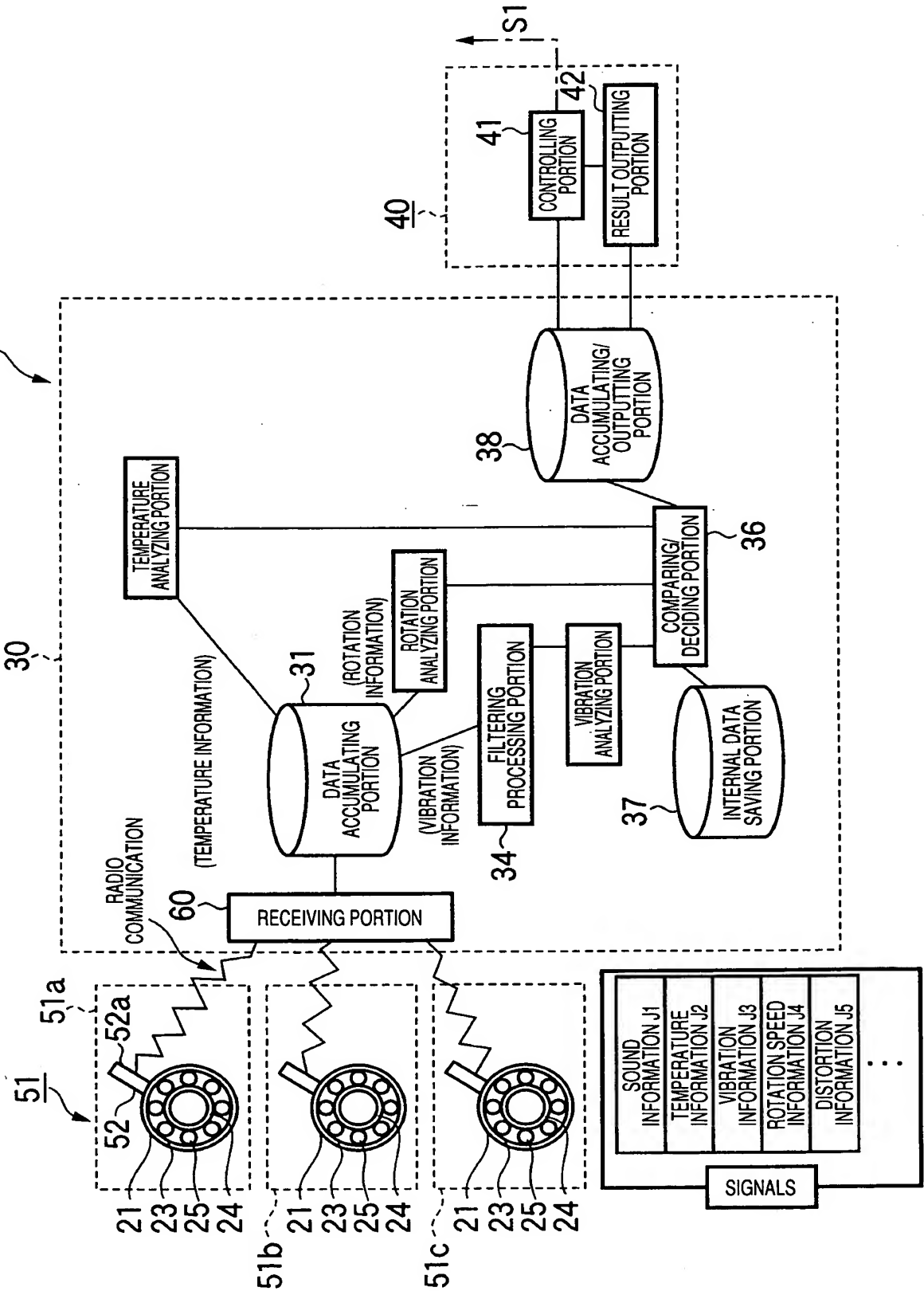


FIG. 28

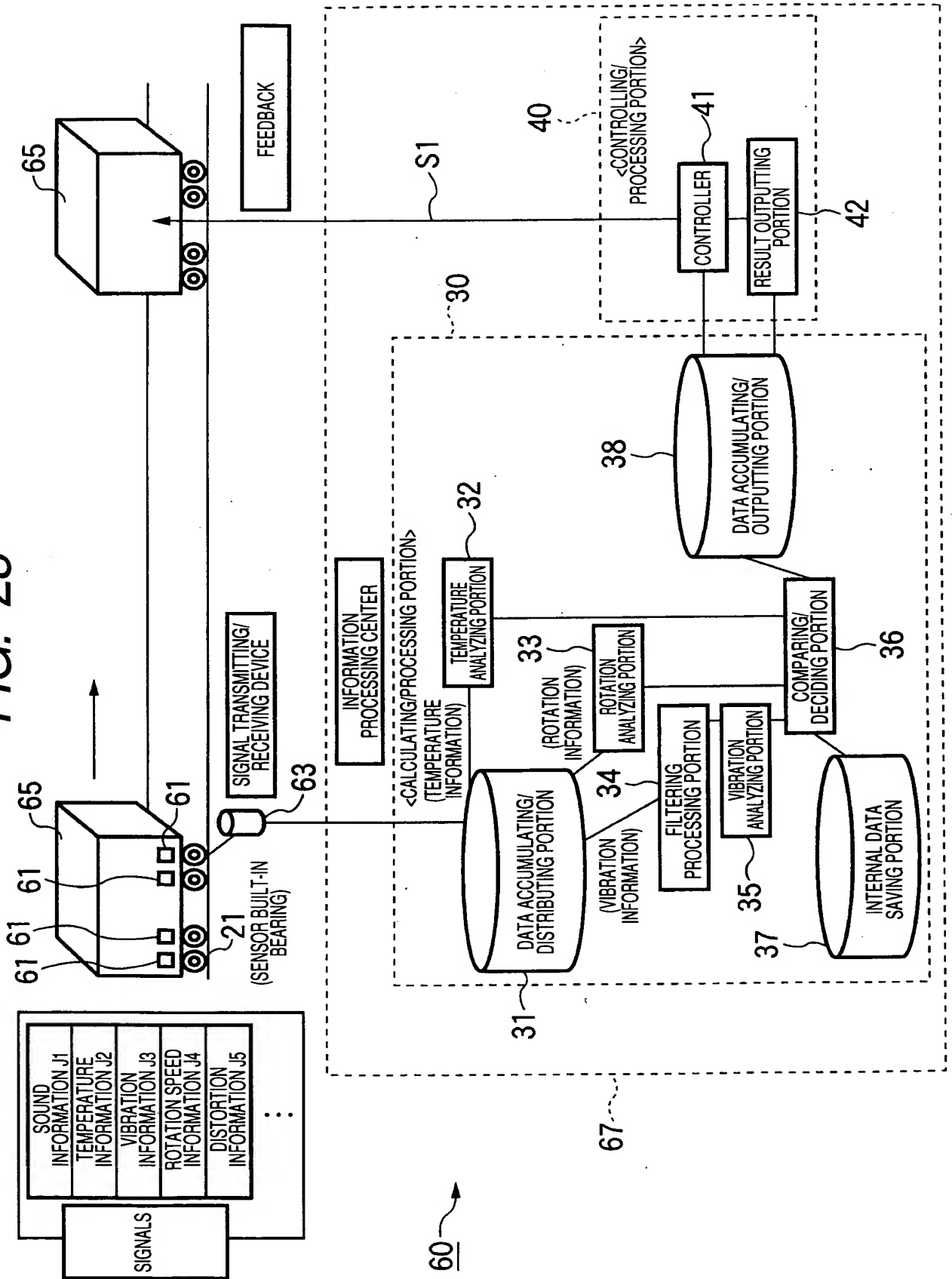


FIG. 29

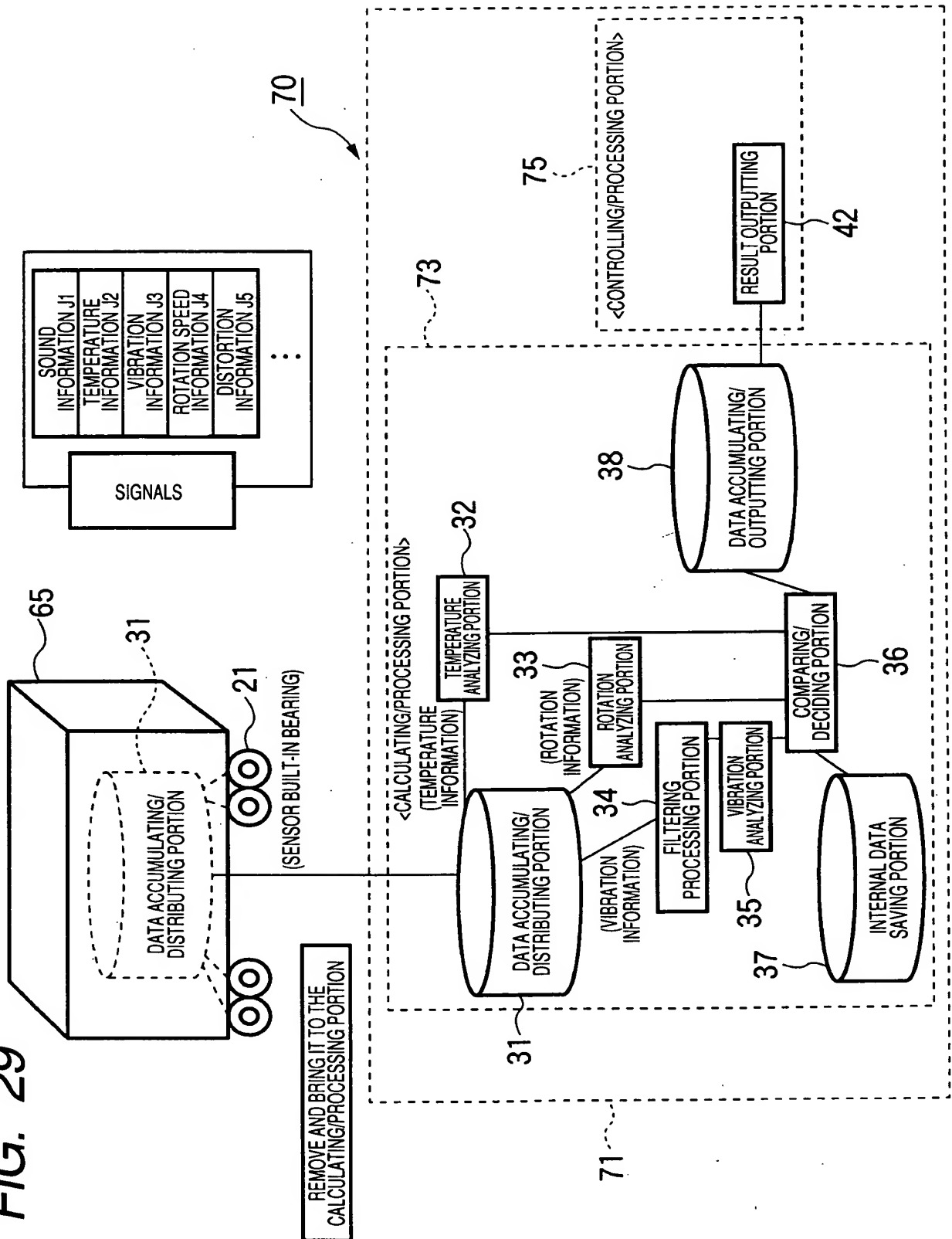


FIG. 30

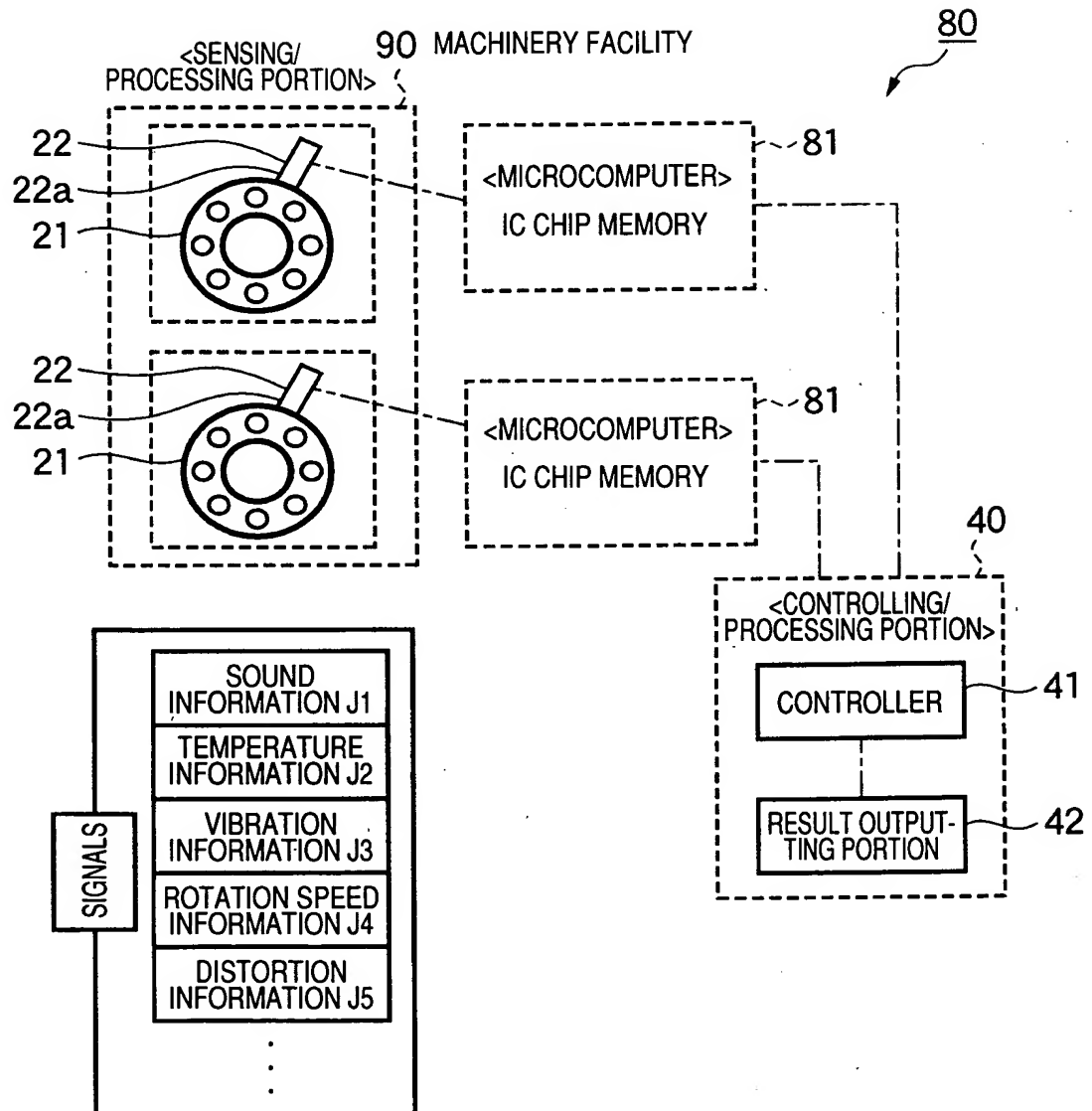


FIG. 31

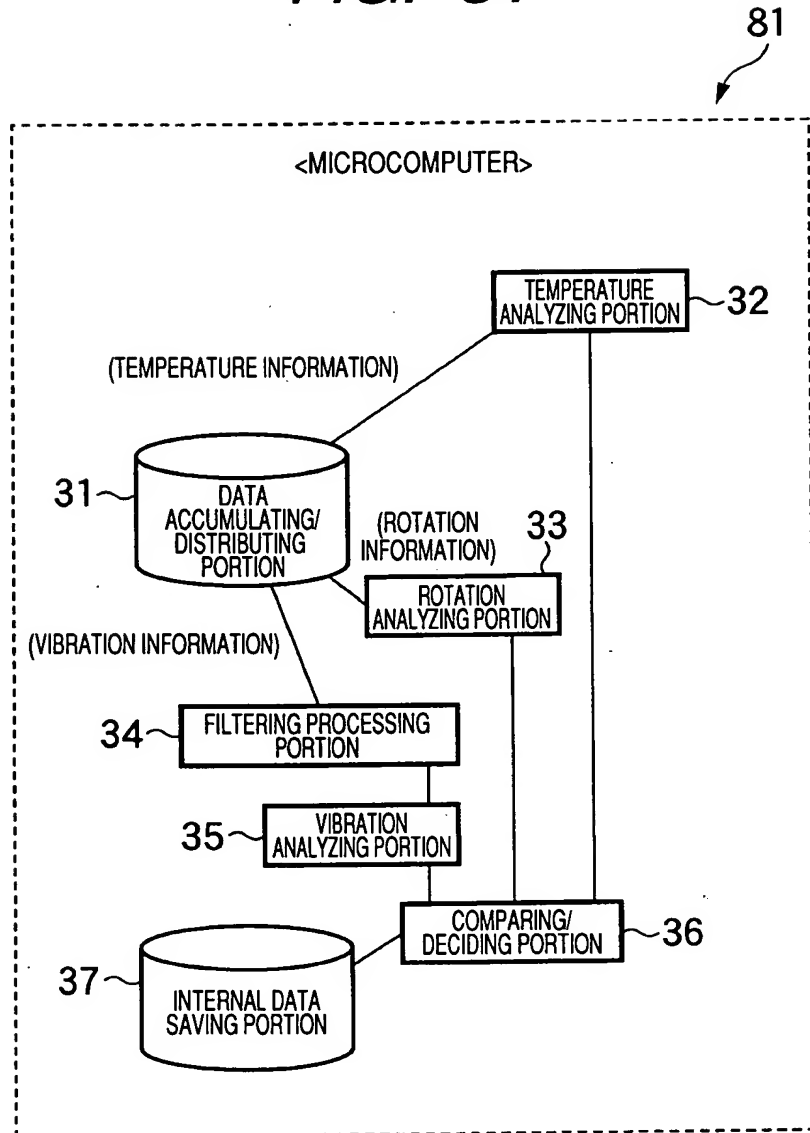


FIG. 32

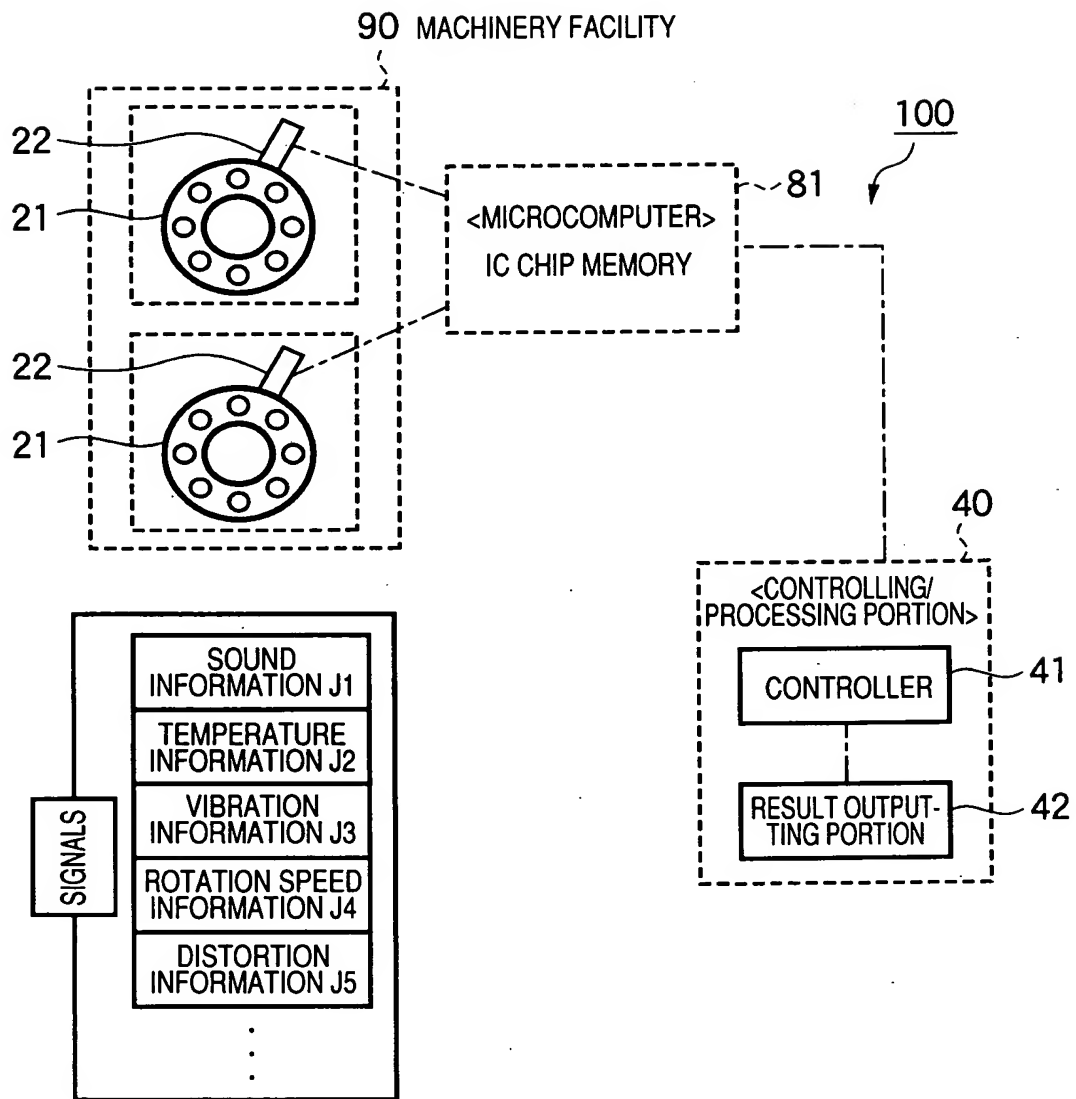


FIG. 33

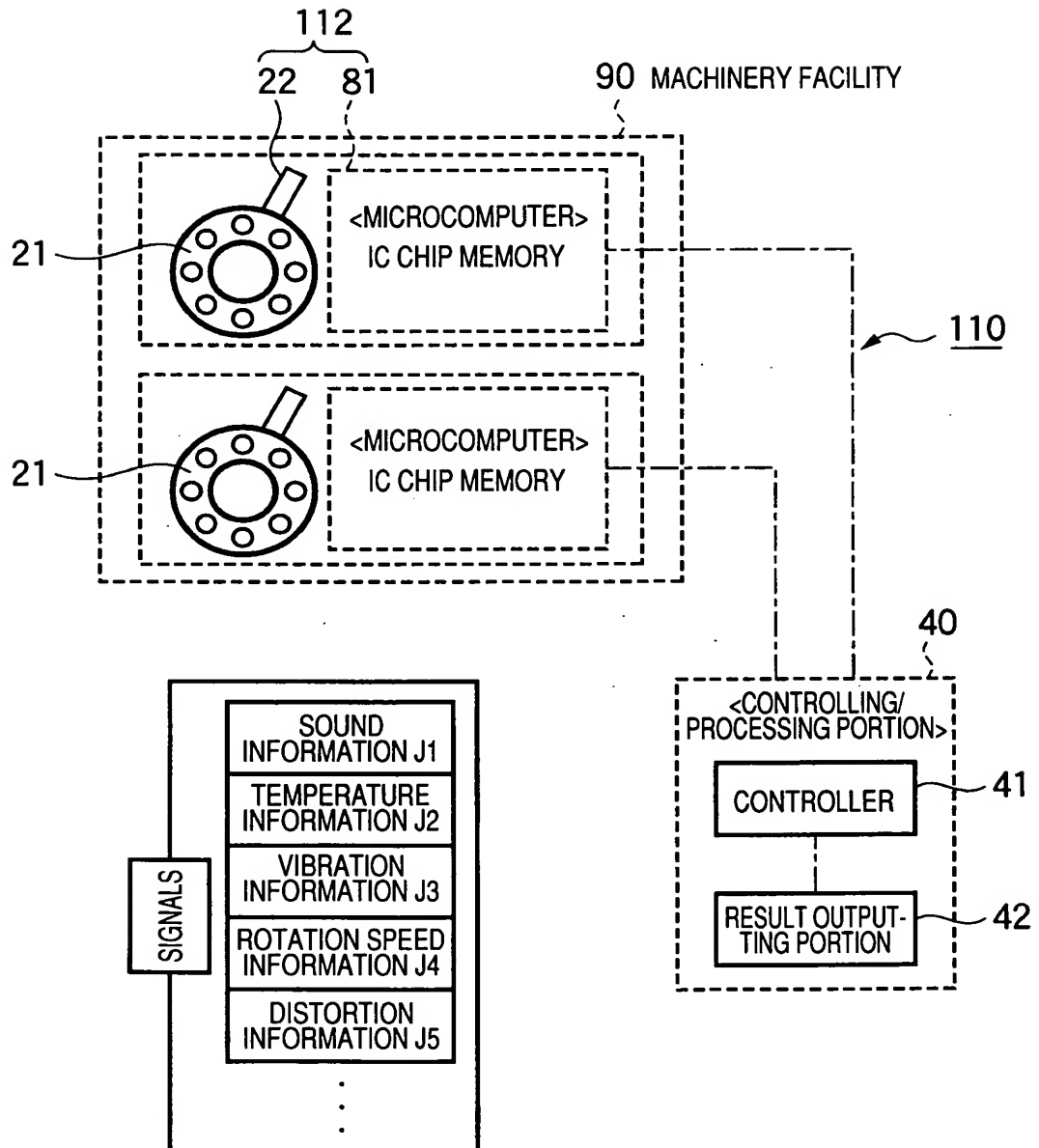


FIG. 34(a)

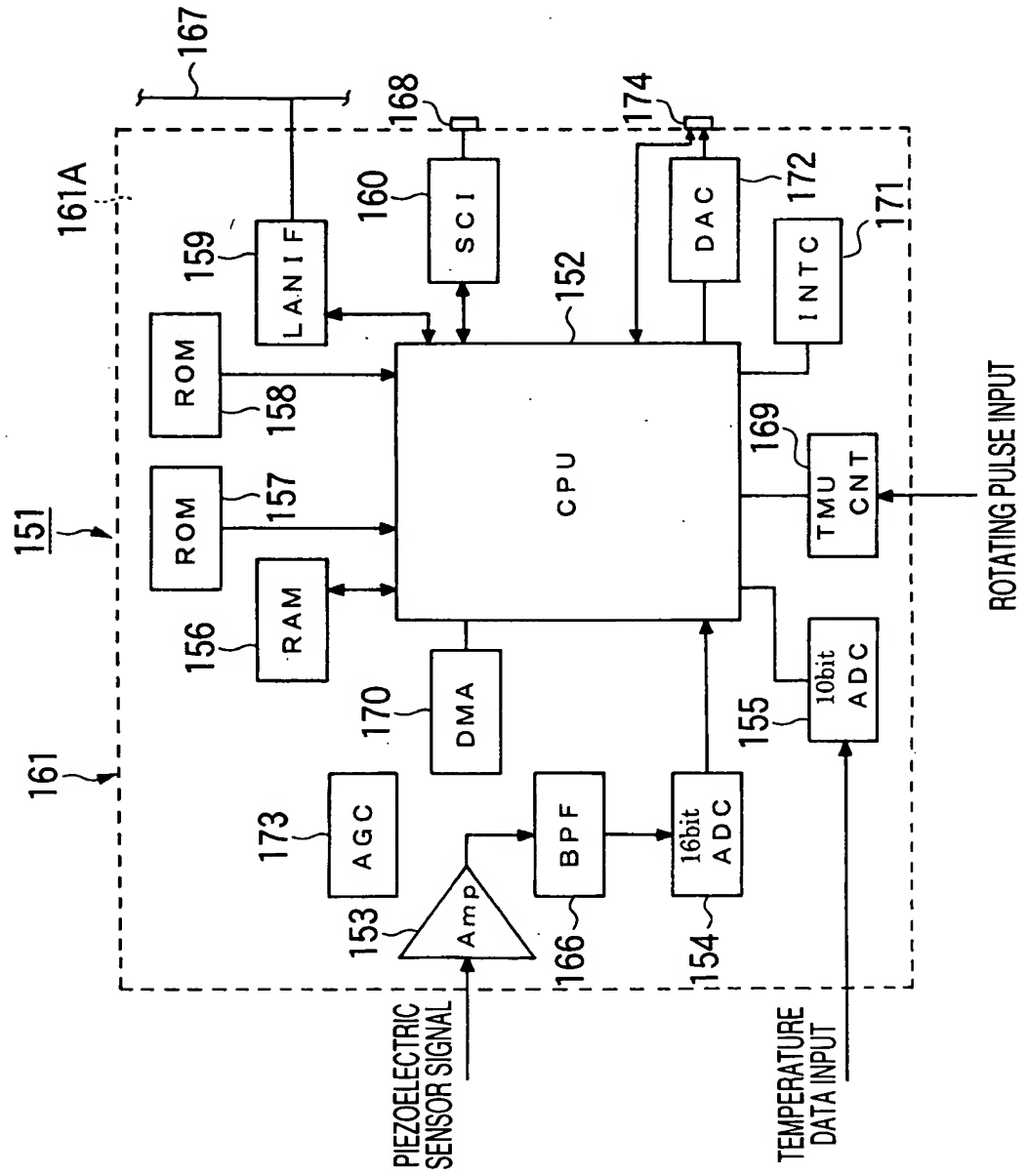


FIG. 34(b)

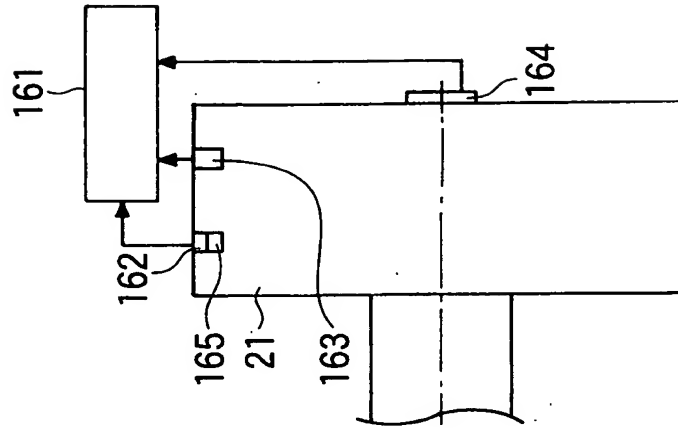


FIG. 35(a)

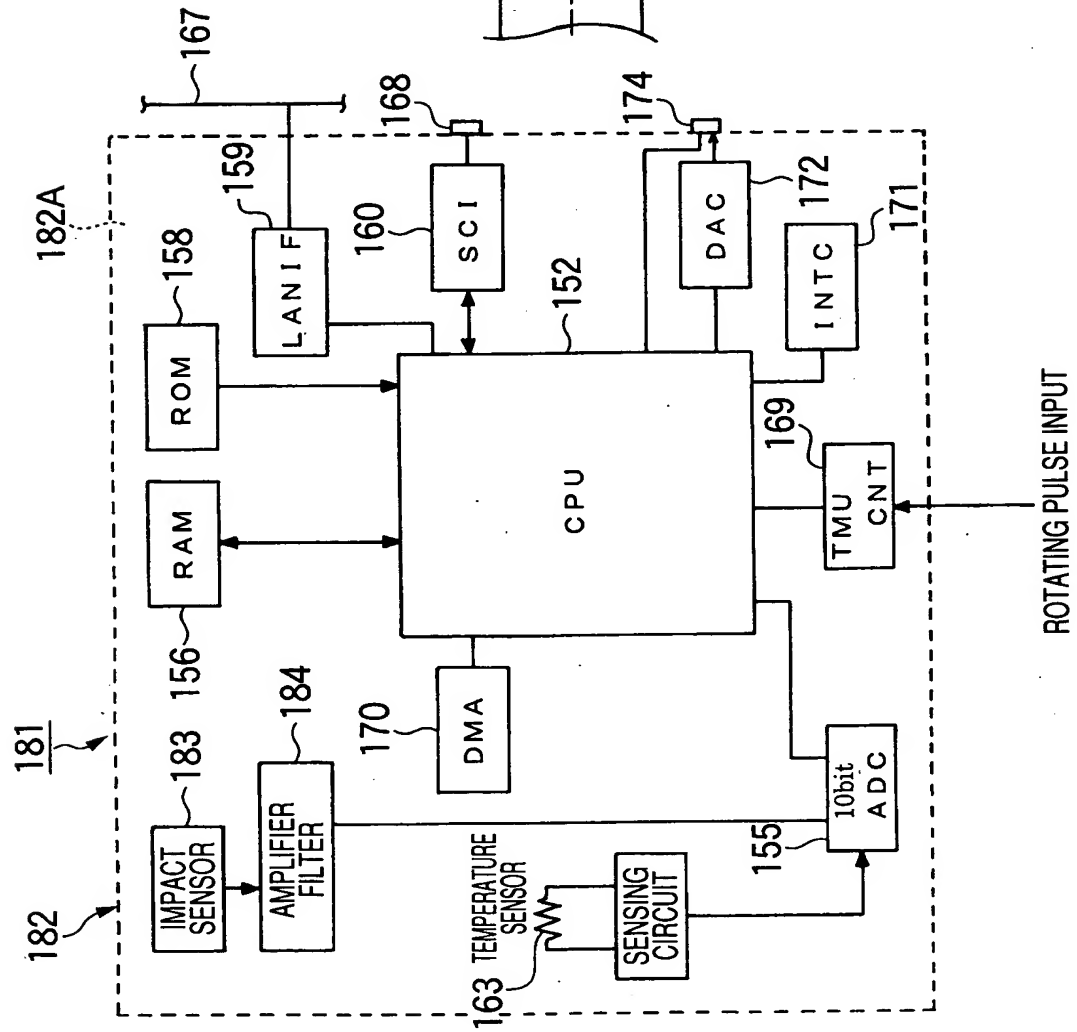


FIG. 35(b)

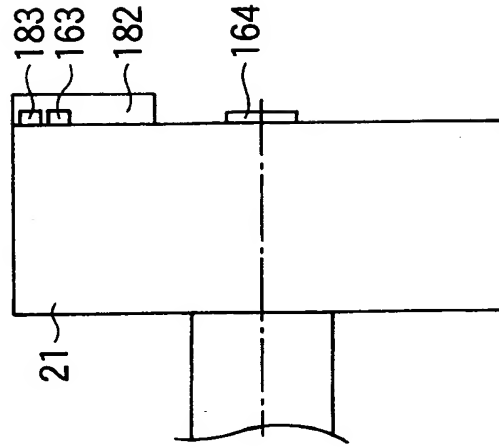


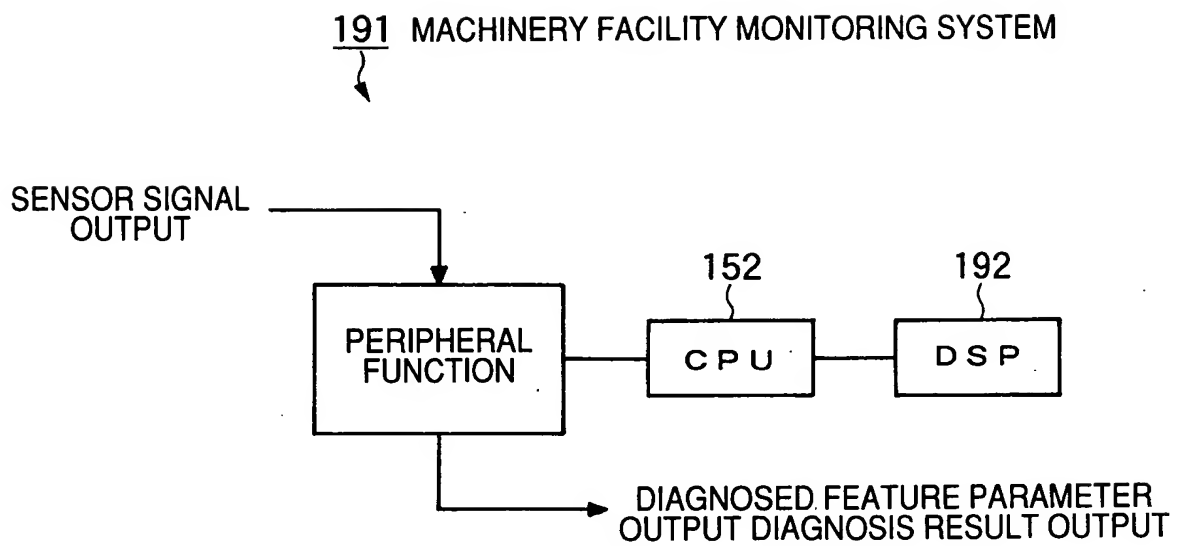
FIG. 36

FIG. 37

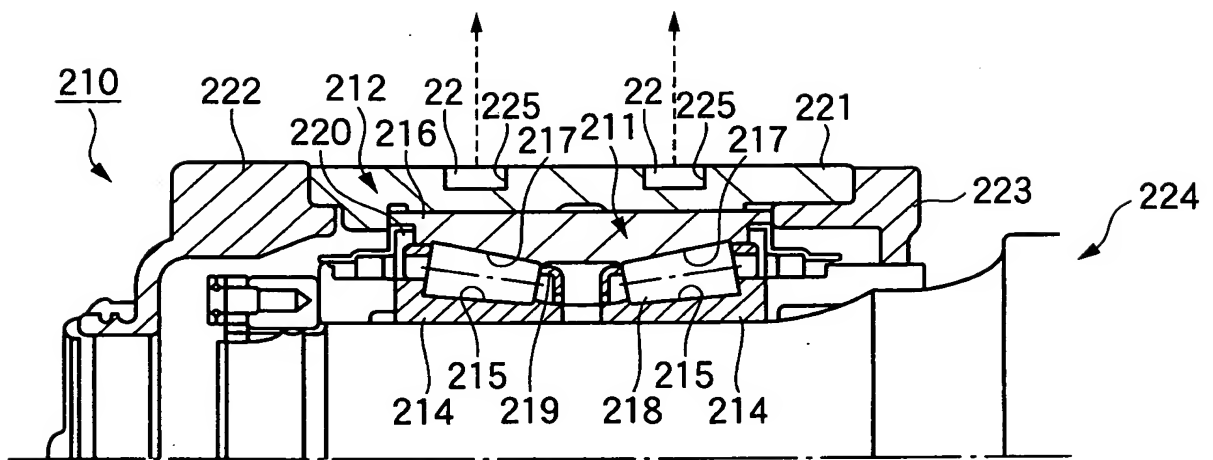


FIG. 38

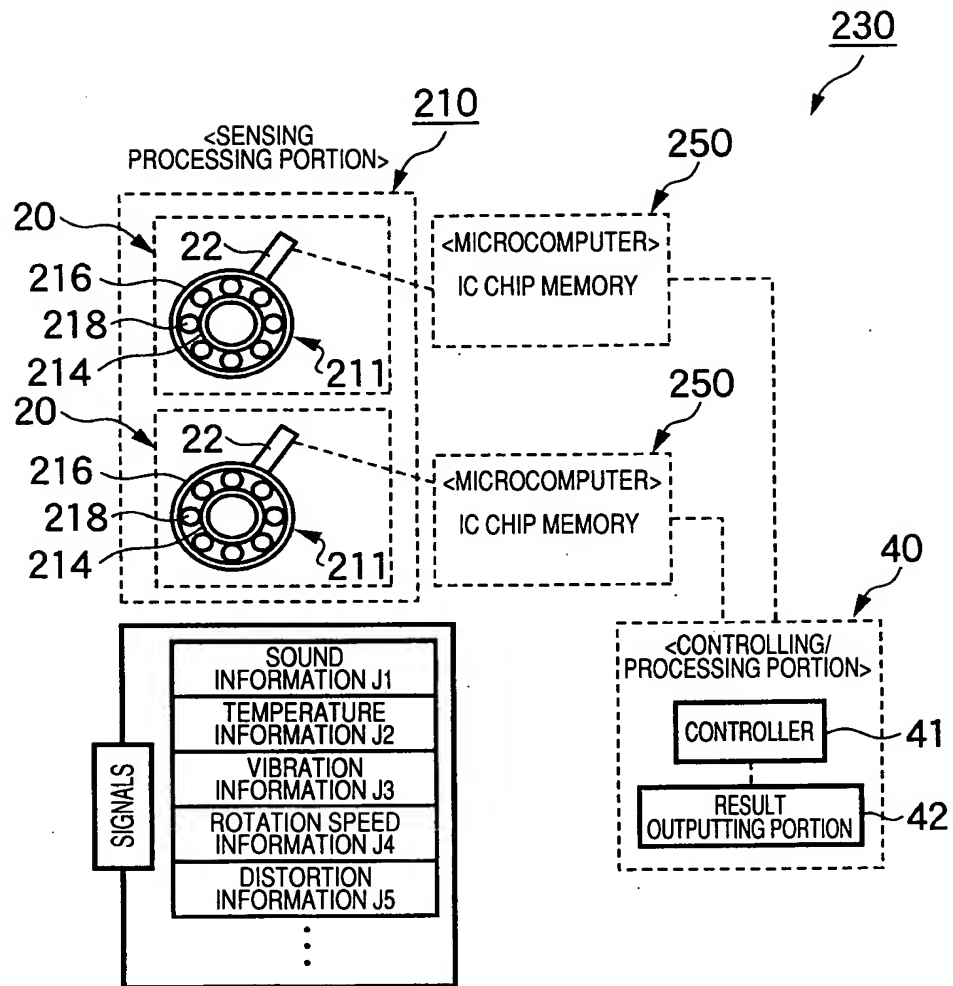


FIG. 39

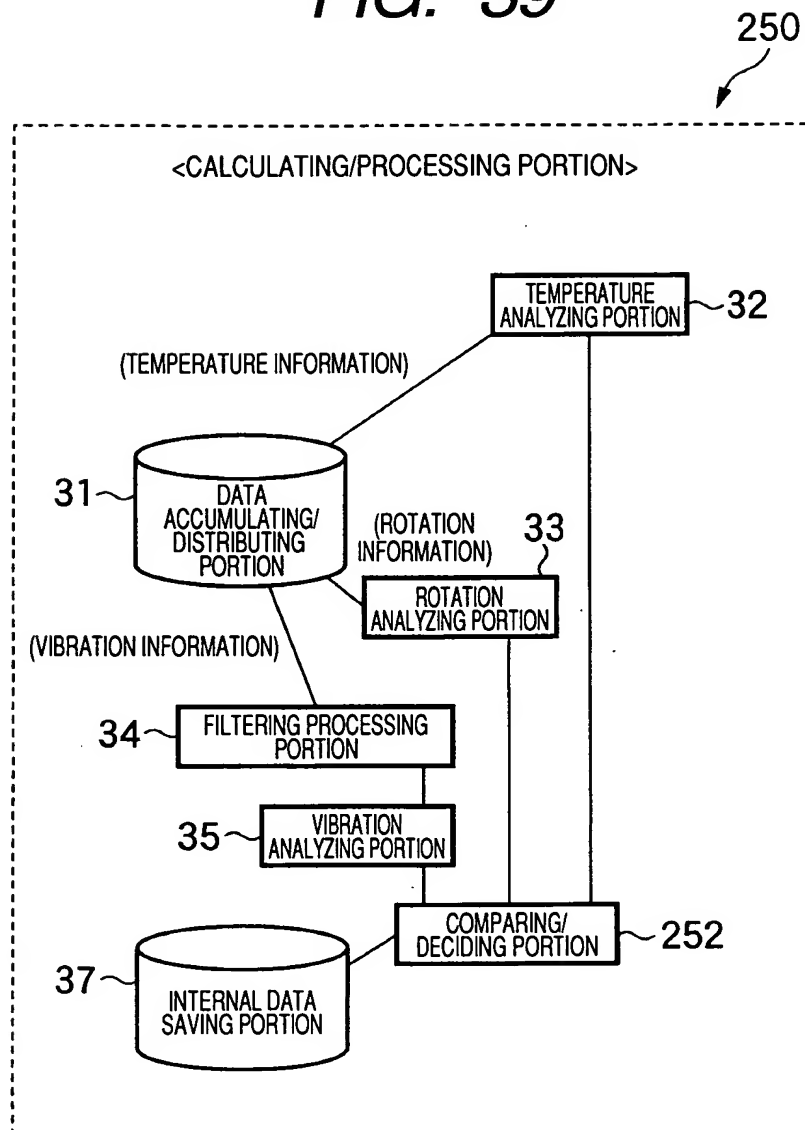


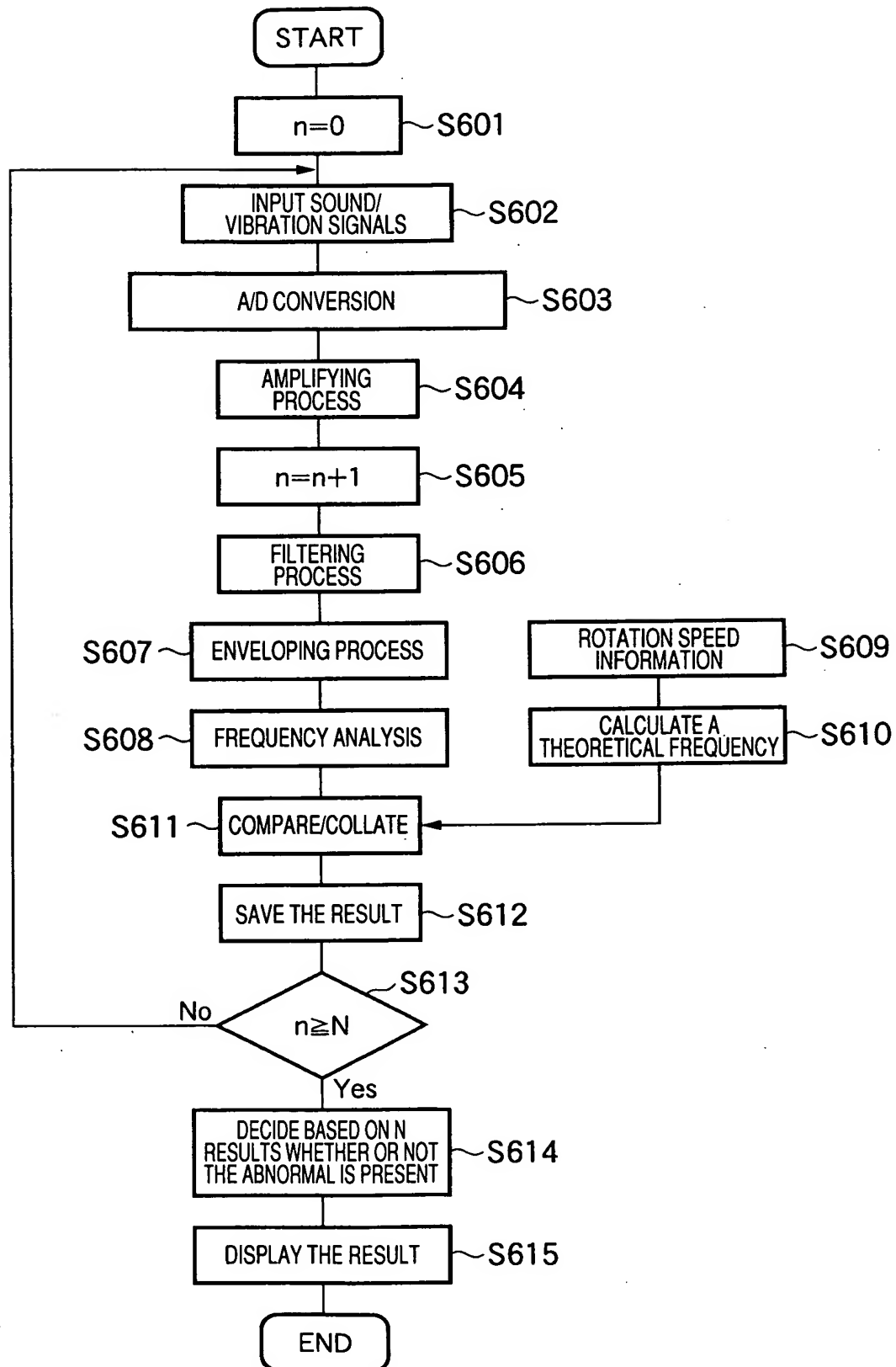
FIG. 40

FIG. 41

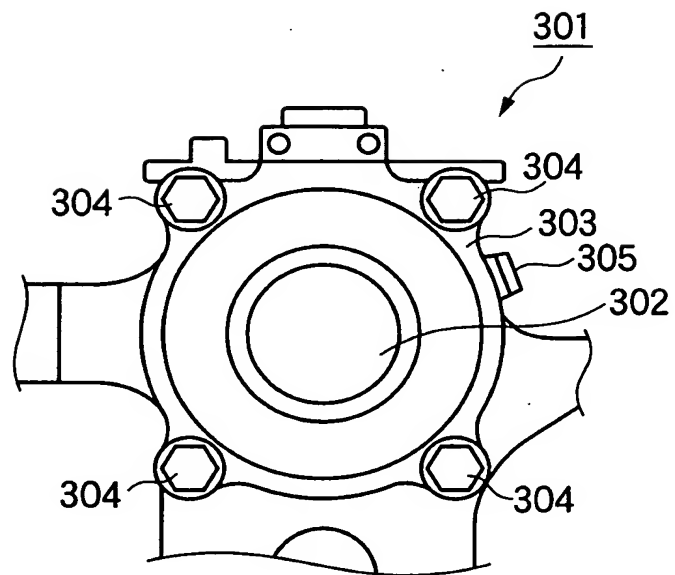


FIG. 42

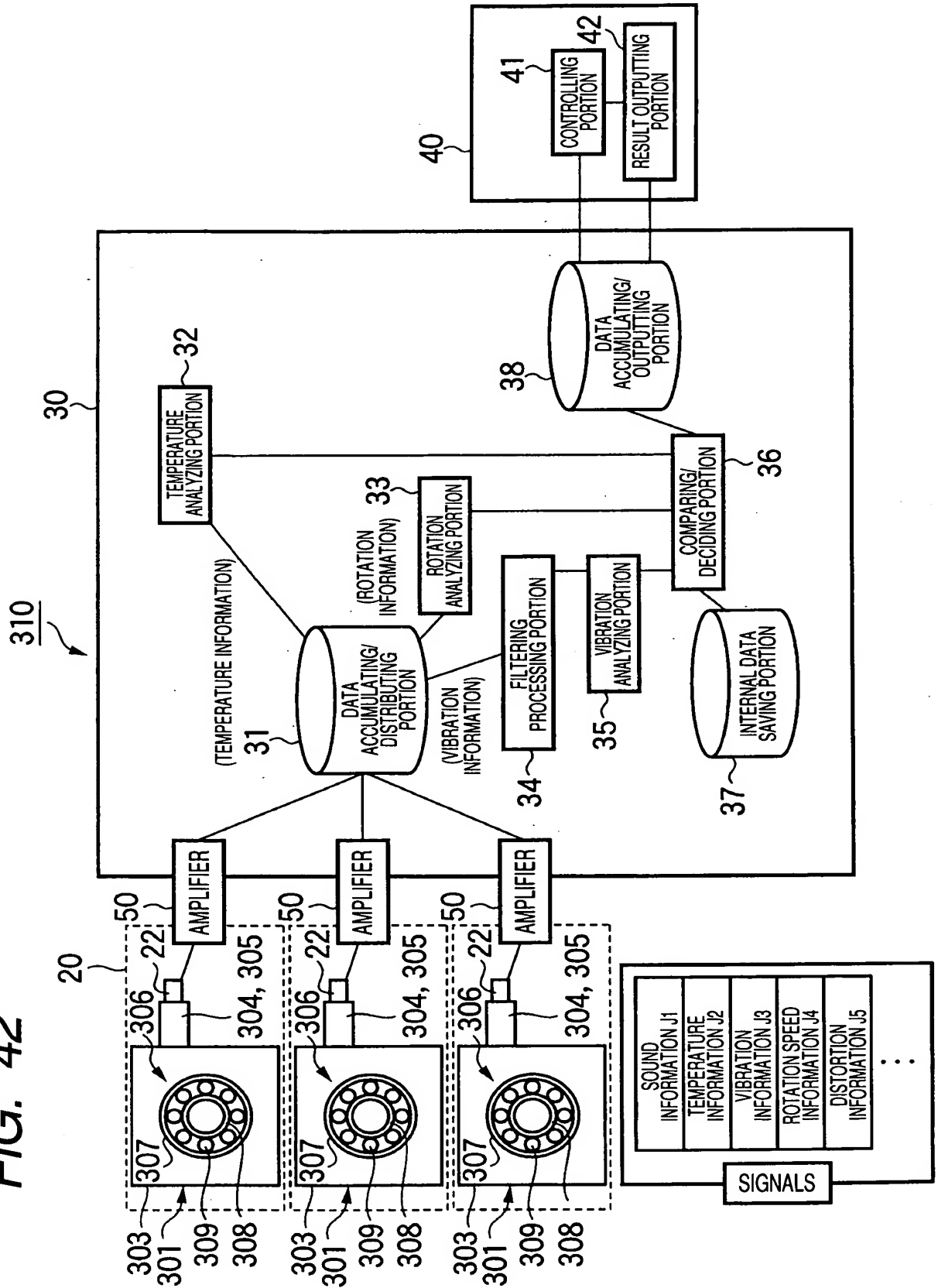


FIG. 43

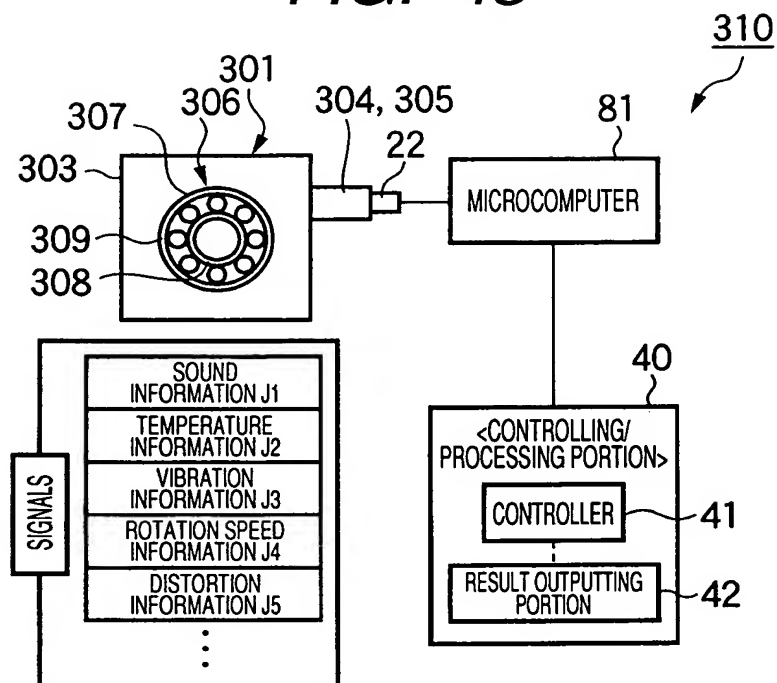


FIG. 44

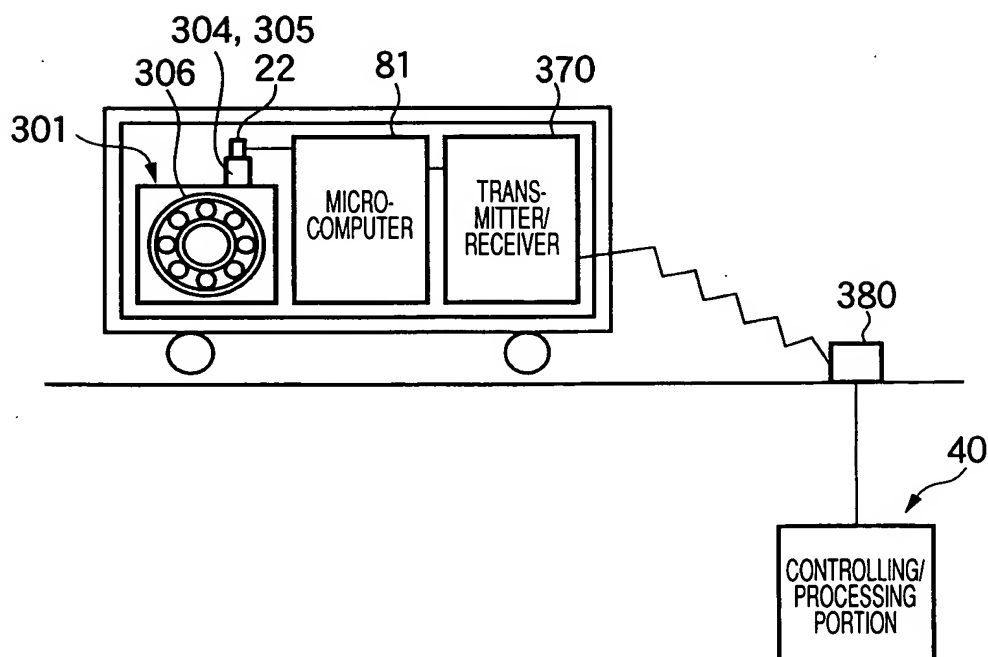


FIG. 46

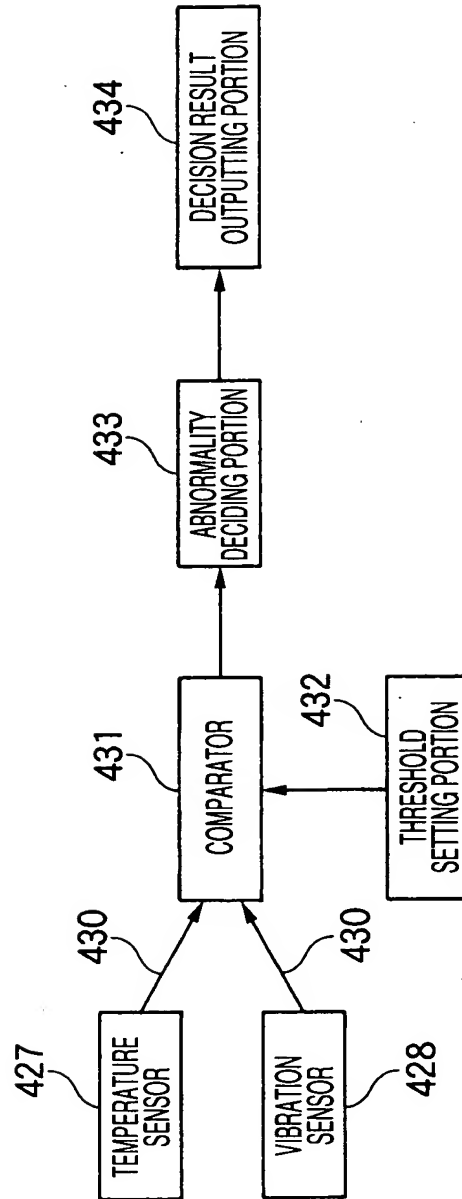


FIG. 47

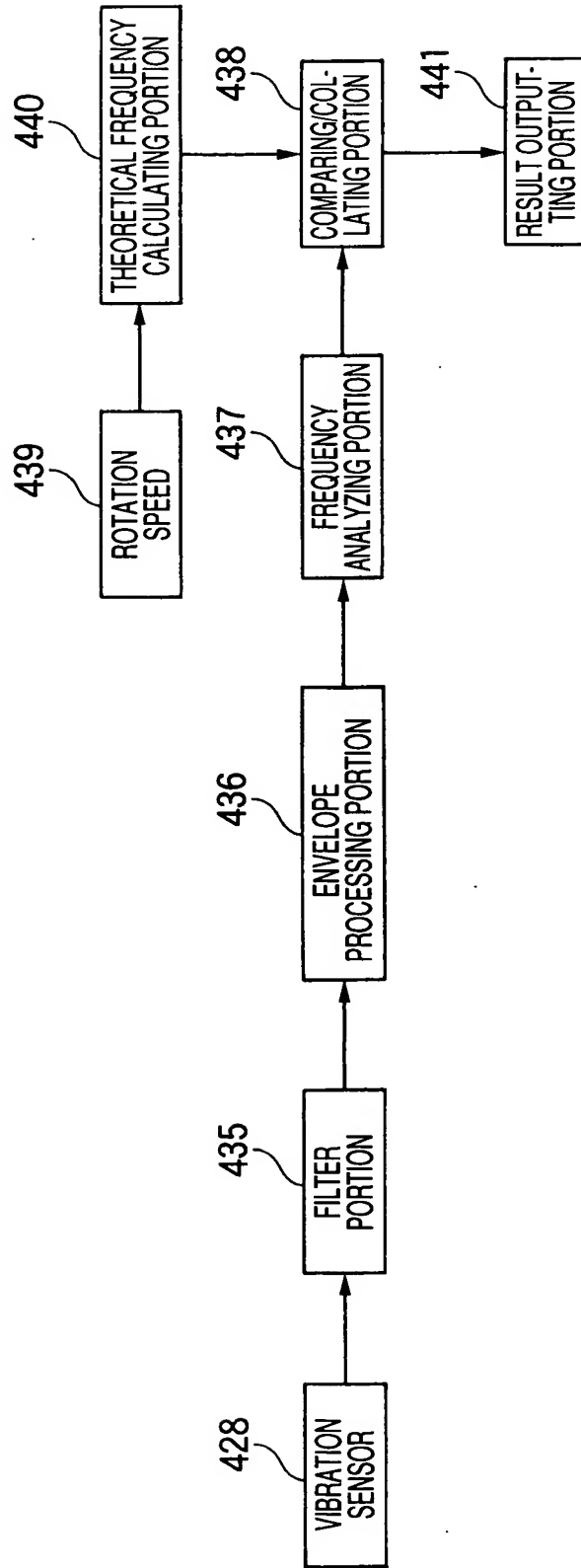


FIG. 50

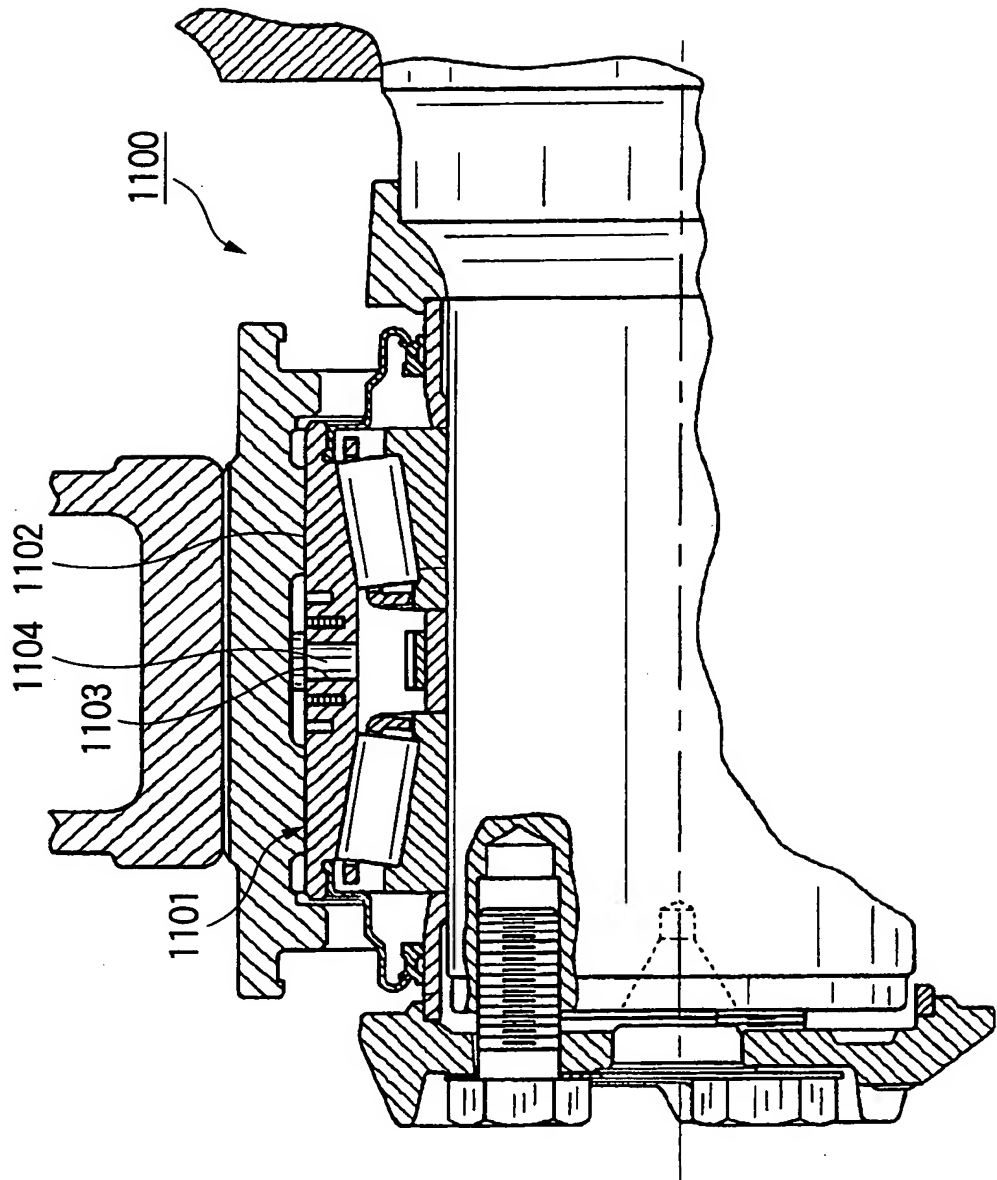


FIG. 51

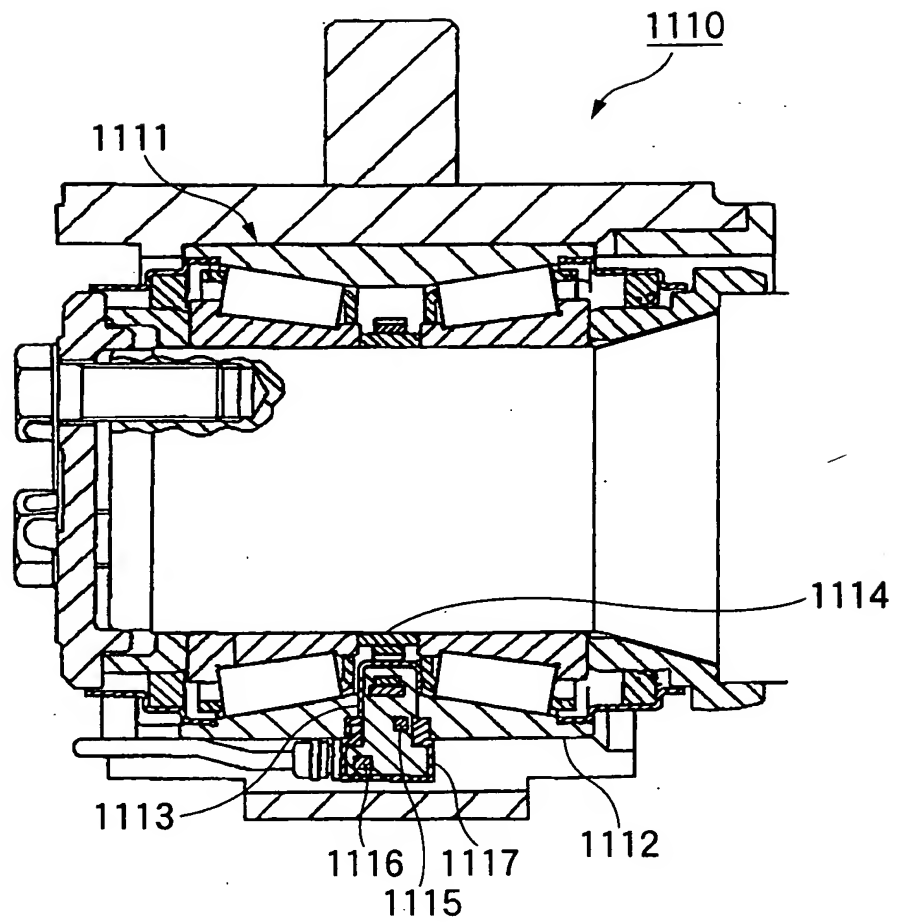


FIG. 52

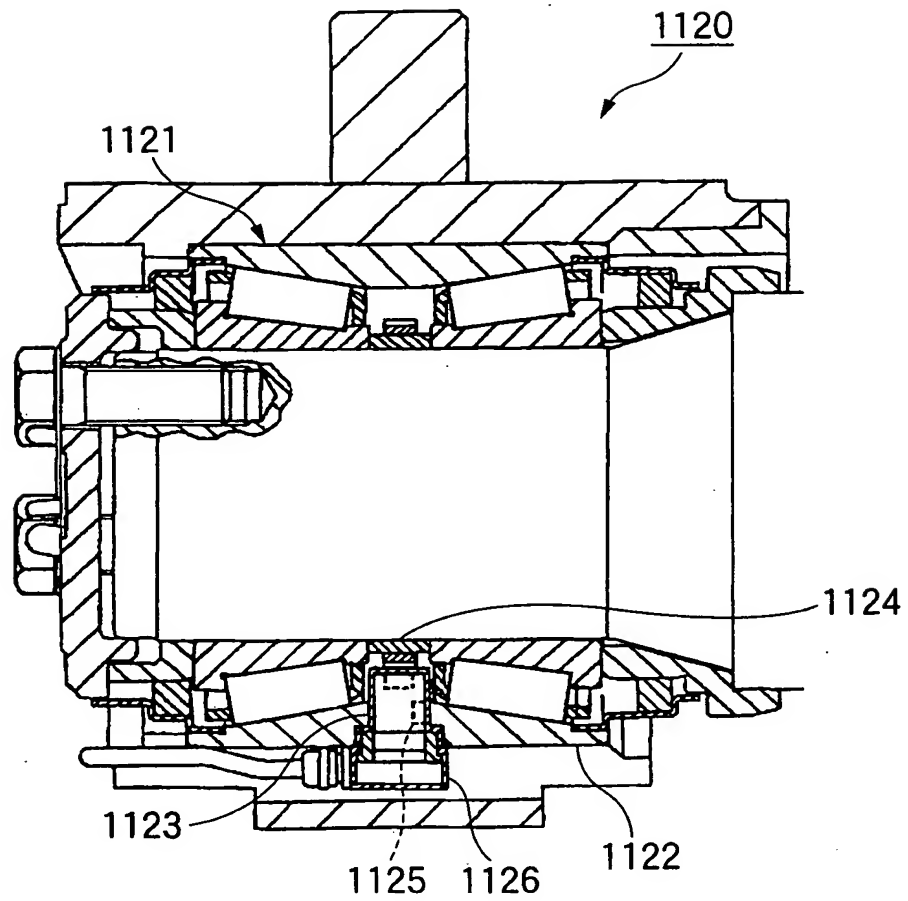


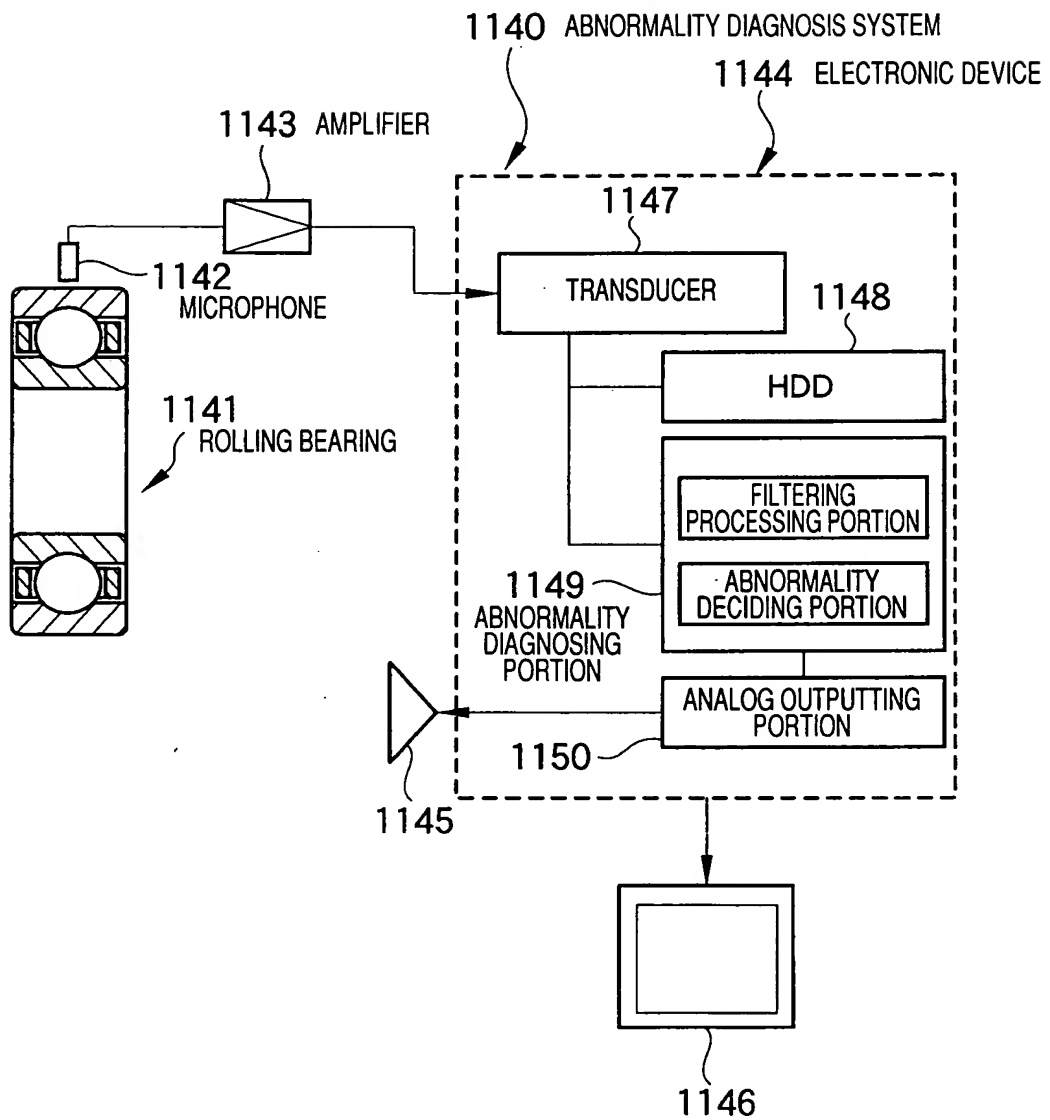
FIG. 54

FIG. 55